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AVIATION DIGEST

JANUARY/FEBRUARY 1992

Professional Bulletin 1-92-1

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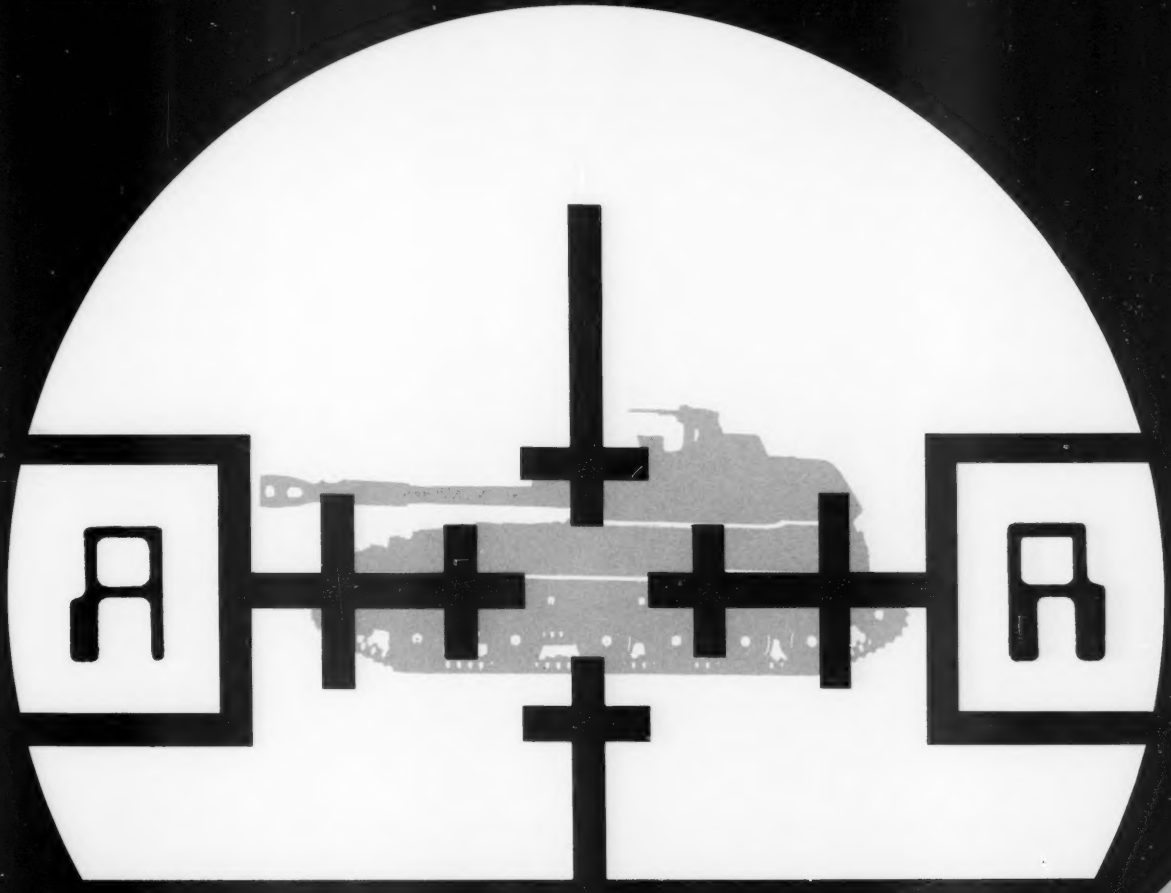

1881

WARFIGHTER 91
and the Counterartillery Battle

AVIATION DIGEST

PROFESSIONAL BULLETIN

1–92–1 ▪ JANUARY/FEBRUARY 1992

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Major General Dave Robinson
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Major General Dave Robinson

Let's Exchange Ideas

The winds of change are blowing throughout the Army and the entire Defense structure. For the past 40 years, military forces and arsenals have been shaped by Cold War demands in a North Atlantic Treaty Organization environment. Recent changes in Europe and elsewhere now demand a contingency-focused Total Army able to respond rapidly to regional demands anywhere in the world.

As the Army restructures, the new strategic environment will provide challenges and opportunities for Army Aviation. The deployable, lethal, and versatile attributes of aviation forces are becoming increasingly important to the combined arms team. Reconnaissance, security, attack, assault, special electronic mission aircraft, medium lift, and air medical evacuation are significant capabilities afforded by aviation in contingency deployments.

During this time of change, a frank and open dialogue among all areas in the Branch is essential. Discussion is healthy, especially as new organizational concepts are explored that harness emerging technologies applied to a smaller, restructured force. We must draw upon the combined strength of the Active, National Guard, and U.S.Army Reserve components and find imaginative ways to harness America's full potential for contingency and mobilized forces.

Our doctrine is being tuned in the areas of deploying and sustaining the force; very shortly, a definitive "How to Fight" aviation piece will be coordinated among our field leadership. Training, organization, materiel development, and leader development matters are being adjusted and updated now against future security needs.

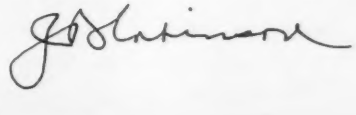
You can and must be a part of the change process; your perspective and sensings, considered in combination with others across the Branch, will be a powerful voice in maintaining the edge for our current forces and in developing a vision for the future.

The *Aviation Digest* is an important forum for idea exchange. I have stated my views on risk assessment in this issue to start the idea exchange. Colonel Kief S. Tackaberry's article highlights the ability of a Light Infantry Division (LID) to overcome range limits of organic artillery using attack helicopters in the counterartillery battle. Such techniques will allow the LID to seize the initiative and "unhinge the enemy's center of gravity"—his artillery assets.

Brigadier General Al Goodbary's speech entitled "A Branch Founded by Dreamers and Doers" focuses on men with vision and the courage to transform dreams to reality. Specialist Tonya Riley's article on the air assault challenge is a superb treatment on a new competition in Army Aviation. More than ever before, we must share our ideas, dreams, and experiences.

In the months and years ahead, I want the *Aviation Digest* to become a forum to exchange ideas and dialogue on meaningful issues that affect our profession across the Branch. I have asked the *Digest* staff to find creative and visionary thinkers, wherever they may be, for thoughtful input on matters that will make our Army better. Minority opinions are encouraged; reader feedback will help all of us to gain a broadened perspective.

I urge you to get your ideas, experiences, and successes before *Aviation Digest* readers. All submissions will receive careful attention—there is no better time than this moment to start working on your letter or article. We will study the issues, meet any challenge, and together, shape the future.



Risk—Its Assessment and Management

by Major General Dave Robinson

Soldiering is tough, demanding, and risky work latent with high potential for danger; it is not for the faint of heart. Soldiering attracts men and women with a "can do" spirit and a zeal for warfighting. By nature, we are not risk averse, nor do we shrink from responsibility.

To deal with the dangers of our profession, we espouse a "crawl, walk, run" training philosophy; however, all too often we find ourselves running when we should crawl or walk. The decision to crawl, walk, or run does not simply happen, it requires the involvement of enlightened leadership—leaders equipped not only with the right thought processes, but the ability to instill these processes in the minds of soldiers.

Human Error

Every mission we execute is a fight against two enemies. One is the declared enemy—the threat to national security. We do not know the exact nature of the next declared enemy, but generally this enemy should be

revealed before battle. The other enemy knows us well. It watches us, and it waits. It singles out individual soldiers, an aircraft—perhaps a tank, an artillery crew, or a truck driver. Then it strikes with nearly inescapable certainty and brings terrible effects. It sneaks up on us in subtle ways, plays on our complacency, and attacks often without warning. This enemy is called *human error*.

The threat of the human error accident targets all battlefield operating systems. For this discussion, I will focus on aviation-related activities. During Vietnam, nearly 50 percent of aircraft losses was due to human error accidents. In Operation Desert Storm, this figure was closer to 75 percent.

While combat operations often mask the cause of accidents, investigations confirm human error as the culprit most of the time. Accidents kill or injure our valuable personnel and destroy our fighting assets; the byproduct is an erosion of our warfighting capability. So then, what is our doctrine to fight this insidious threat? How do we train our leaders and soldiers to defeat human error accidents?

Risk Management

The process used to defeat this threat is called *risk management*. You say, "Hold it, I am a warfighter; some things are just the price of doing business, and all this assessment stuff is for wimps!" I hope you do not think this way! Whether you do or not, read on because it will be worth your time.

Risk management is a *leadership* process. It involves identifying and assessing hazards, making risk decisions, implementing controls, and supervising at all levels. This process begins with an evaluation of hazards, in short, a risk assessment, which is much like the intelligence preparation of the battlefield. Both techniques deal with definition of the threat, its capabilities, its methods, and where it may strike. The overall process of managing risk is analyzing your environment, and then calculating the best way to defeat an enemy. It also is related closely, if not identically, to the process we use to formulate the operations estimate. Leaders need a risk management mind-set, a process through which we must teach people how to think, not what to do.

There are hazards involved in nearly everything we do in the Army—in peacetime and war. Over the years, we have struggled with hazard elimination and reduction in a variety of ways. Some of you may recall the "zero defect" days. In marked contrast, some leaders accept accidents as a "cost of doing business." After all, they say, a little blade strike does not hurt anyone. One tank bumping into another is no sweat. After all, tanks are made for tough action.

Some view risk analysis as "incompatible with the warrior spirit." The truth of the matter is the U.S. Army Safety Center folks have been keeping a book on us for a long time—the statistics are condemning. Our equipment is reliable; people cause most accidents.

If we are excessively safe in peacetime, must we defer tough, realistic training? Of course not, but we must decide when it is prudent to crawl as opposed to walking or running in our training regimes. As the Army becomes leaner and relies more on fewer high technology systems, each system is a significant national fighting asset. If we crash a helicopter, it is gone from the fighting force forever and will not be replaced—to say nothing of the agony and heartbreak of losing a soldier needlessly. Risk management is not risk elimination. The only way to eliminate risk is to stop training. We must perceive potential risk, assess its impact on operations, decide where and when it is prudent, and then take action to reduce or eliminate it. There is a simple way to get at this matter. At every level in an organization, we need to ask these three questions:

- Who will have the next accident in my unit or section?
- What kind of accident will it be?
- What am I doing about it right now?

When we ask this last question, the answers are surprising. "Well, I really do not know--I have not really looked at it this way before;" "We are not going to have any accidents;" or "Well,

I am going to work real hard with the maintenance folks to be certain they do their work to standard." Each of these replies tells me the respondent does not understand risk assessment, since none mentioned the culprit—*human error*.

We have not done a good job of teaching leaders how to deal with risks. Current risk management techniques often "boil down" to checking the blocks; adding up the numbers to determine low, medium, or high risk; and, then, regardless of the finding, moving out to accomplish the mission. The process is short on *reduction* or *control*. Too often leaders do not get involved.

Risk management education focuses on the explicit and implicit dangers in our profession. We must have leaders who are willing to nurture subordinates to take intelligent risks and discourage the "gamblers," even if it looks like a gamble might pay off. Concentrate on the decision processes that take place before and during each mission and each exercise. We are not on the horns of a "risk versus realism" dilemma, but we are asking leaders to look at their organizations in a new way. When we assess who will have the next accident and resolve to do something about it, we will have made a giant step in really understanding our organizations.

The risk management process must include a tailored form of the "mission briefing." When risk is assessed and found acceptable, it does not necessarily mean that the crew is golden. We spend hours in premission planning to defeat the declared threat. Now, let us start a "risk preparation of the battlefield" to fight the other, more elusive enemy. Brief the soldier on the most likely threat that will kill him—whether a poor scan technique, the ZSU-23/4, excessive speed, or landing at night in dusty conditions.

A leader may use, or fail to use, proper risk management techniques and never have an accident. A pilot or driver may get into the habit of using the same poor technique, or shortcut, and may use it a hundred times without that final, irreversible, negative feedback. Often, others have noticed a future fatal behavior, and failed to take corrective action. Risk management is not a spectator sport. It is a contact sport that requires total participation. While experience, one source of feedback, is a great teacher, our experience base is shrinking. As veterans of more recent conflicts replace the last "bubble" of Vietnam-experienced aviators, risk assessment and management initiatives become paramount.

We must get to the point where legitimate risk management techniques are performed consistently by *every* leader and *every* soldier in *every* job. The best risk assessment questions are asked by the crews themselves, but there are psychological dimensions that make self-evaluations and peer evaluations difficult. We have tough, young, mission-oriented aviators and leaders who are adverse to refusing a mission—few desire to shrink from mission accomplishment. No amount of proper risk management by the chain of command can overcome a careless operator, but it can put them in the spotlight before they screw up something. Hold your people accountable for their thought processes.

Over recent years, we have made incredible strides in safety. We have to capitalize on what we know. We must study risk management, assess techniques, and teach young leaders and soldiers how to think about risk—not merely hand out "school solutions." We must question regulatory requirements that could lead to unsafe practices.

We want to reduce the Class A aircraft accident rate to below one per 100,000 hours and Classes B and C rates by one half the current rate. We can do it and more, but only with your help! There are no gimmicks nor complicated formulas—just common sense and answers to these three simple questions:

- Who will have the next accident in your unit?
- What kind of accident will it be?
- What are you doing about it?

Major General Robinson is the Commanding General, U. S. Army Aviation Center and Fort Rucker .

VIEWS FROM READERS

Editor:

The article "An Aviation Brigade Goes to War" in the September-October 1991 issue of the ***U.S. Army Aviation Digest*** was right on the mark. I was the Fire Support Officer for the 4th Brigade at the time, and was able to observe the actions of the Brigade first hand.

In my opinion, the key ingredient in the success of the Brigade was the high level of training it maintained. This is best illustrated by the actions following the 8 November 1990 announcement that the 1st Armored Division would be deployed to Operation Desert Shield.

When the word came, there was no rush to do any "catch-up" work. That is, no one had to go out and fix anything. No one had to rush out and update their standing operating procedures. No one had to go to the simulator and practice. No one had to assemble their crew or staff and rehearse. In short, the Brigade was ready on the day it was called.

The unit readiness can be attributed to the exemplary command climate created by Colonel (COL) Patrick J. Bodelson, the previous commander, and nurtured by COL Daniel J. Petrosky, the commander during Operation Desert Storm. They recognized that they had quality soldiers and leaders in the Brigade. They gave those people the guidance, time, and resources to train safely and thoroughly.

They were successful!

Major Timothy J. Sweeney,
Field Artillery
Nuclear Surety Officer
U.S. Army Nuclear and
Chemical Agency
Springfield, VA

Editor:

The Computer Science School at the U.S. Army Signal Center, Fort Gordon, GA, is developing a new course to support FA 53 (systems automation) officers. The Systems Automation Course (SAC) II is being developed to prepare FA 53 officers who are currently serving in branch-related assignments for upcoming FA 53 assignments. This course will quickly bring an officer up-to-date with current automation technology and Army automation issues. It also will provide the officer with the critical skills that will be required in his next assignment.

SAC II is 4 weeks, 4 days long and should be scheduled en route to an officer's next FA 53 assignment. The first course is scheduled for January 1993 with courses being conducted on a quarterly basis thereafter. The requirements to attend the course are to: be on orders to a FA 53 assignment; be a Major (MAJ) or Colonel (COL); and have served outside of FA 53 for at least the last 3 years.

For more information on this new course, please contact Captain Prantl at DSN 780-3236 or through DDN as "prantl@gordon-emh2.army.mil". To request seats or other FA 53 assignment information please contact MAJ Welch at DSN 221-2759 or through DDN as "welchd0@hoffman-emh1.army.mil"

COL Archie D. Andrews,
Signal Corps
Director, Computer Science
School
Fort Gordon, GA

HOTLINES

Aviation Center - The Aviation Center Hotline is here to assist you. The line is monitored 24 hours a day. The Aviation Center will provide feedback within 72 hours on such topics as: Aviation training and doctrine; aircraft systems; aircraft survivability; tactics, techniques, and procedures; or any other aviation-related subject. The Hotline number is DSN 558-6487 or commercial 205-255-6487.

Infantry Center - The Army relies heavily on field input to modernize doctrine, equipment, and support for the soldier. Thus, the U.S. Army Training and Doctrine Command Systems Manager-Soldier, Fort Benning, GA, now has a 24-hour Hotline. This Hotline gives soldiers and commanders a voice in deciding what a soldier wears, carries, or consumes in a tactical environment.

The Infantry Center seeks your recommendations to improve battlefield capabilities of leathality, command and control, survivability, sustainment, and mobility, and to lighten the soldier's load. Call the Hotline at DSN 835-1245 or commercial 404-545-1245. Use these numbers until a toll-free line is established.

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DEEP ATTACK AND THE COUNTER-ARTILLERY BATTLE

Colonel Kief S. Tackaberry
Lieutenant Colonel James A. Kelley
Captain Thomas M. Muir

7th Infantry Division (Light)
Aviation Brigade
Fort Ord, CA

This article outlines the 7th Infantry Division (Light) concept of deep operations for a light infantry division. It portrays **decide-detect-deliver** methodology, and command and control structure. It highlights Battle Command Training Program Warfighter 91—events leading to the neutralization of enemy artillery and the eventual destruction of more than five enemy divisions in 4 days.

The Battle Command Training Program (BCTP) Warfighter Exercise was the training highlight of the 7th Infantry Division (Light) (7ID(L)) during Fiscal Year 1991. The Division's successful achievements largely were due to the near flawless synchronization of cross-forward line of own troops (FLOT) deep attacks against the enemy's overwhelming number of artillery assets.

The scenario for the 7ID(L) Warfighter 91 was a mid-intensity conflict fought in a contingency area. The sheer numbers and ranging capabilities of enemy artillery assets limited the commanding general (CG) from maneuvering his forces. Success for the Light Infantry Division (LID) lay in seizing the initiative

early by unhinging the enemy's center of gravity—his artillery assets.

Later, the Division would infiltrate the enemy's security zone; simultaneously attack across the breadth of the main defensive belt; secure key terrain; and allow for the forward passage of friendly forces to continue the fight.

Initially, two enemy divisions facing the 7ID(L) defended in successive belts and had several days to prepare their positions. The enemy had pushed his divisional and corps artillery groups forward to provide overwhelming long-range fires to support the continuity of his defense. His artillery included regimental artillery groups (RAGs), division artillery groups (DAGs), and the corps artillery groups (CAGs).

The enemy's artillery assets were well integrated into the defensive plans and fires; they were protected by air defense artillery (ADA) systems, ranging from SA-7s/SA-14s to ZPU-4s and S-60s; they threatened the survival of the 7ID(L) since the enemy's artillery could out-range ours.

Mission, enemy, terrain, troops, and time available (METT-T) analysis indicated the 7ID(L) must go beyond current doctrine to win the counterartillery battle by conducting successful deep operations.

To win the counterartillery battle, the CG had to successfully conduct deep operations. To establish the conditions to win the close battle, the process would be dispersion, concentration of forces, decisive engagements, redispersion, and reconstitution.

The CG decided the best course of action was to mass artillery, USAF (U.S. Air Force) BAI (battlefield air interdiction) assets, and attack helicopters (ATKHs) in a synchronized deep attack; then to destroy the enemy's artillery assets before the light infantry forces began their infiltration attacks.

Concept of the Operation

The mission was simple and concise in nature, yet complex in execution: "Aviation Brigade attacks 042100 Aug 91 to reduce enemy RAGs and DAGs vic EA [engagement area] DUKE."

The CG was relying on the Aviation Brigade to win the counterartillery battle—in highly synchronized deep operations with DIVARTY (Division artillery) and USAF BAI assets—allowing for freedom of maneuver for close operations during phase II.

He declared, "My intent is to focus on NVG [night vision goggles] operations to maximize surprise and enhance our survivability. We will synchronize JSEAD [joint suppression of enemy air defenses], artillery fires, and USAF BAI to mass fires for the deep attack." He defined success for the Aviation Brigade during phase I and phase II as the reduction of enemy artillery to 25-percent strength before commitment of the Division's other maneuver brigades.

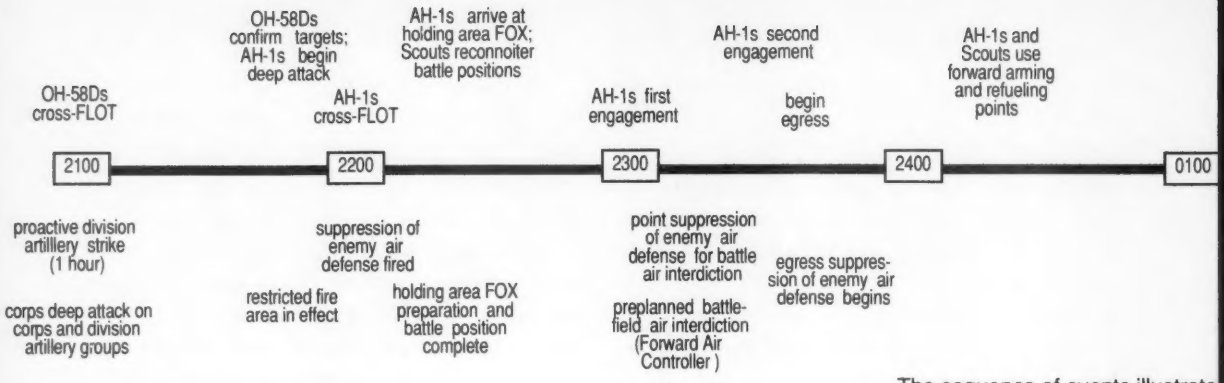
The concept for deep operations was to develop a detailed intelligence preparation of the battlefield (IPB) and use divisional and Corps assets available to support a **decide-detect-deliver** methodology. The deep attacks were a joint operation combining all of the battlefield operating systems, 20 to 30 kilometers (km) beyond the FLOT, into a single offensive force.

Intelligence Preparation of the Battlefield (IPB)

The IPB for deep operations focused on developing courses of action for **deciding** to attack deep. Named and targeted areas of interest (NAIs and TAIs) were forwarded as requests for information (RFIs) to Corps to **detect** the locations of enemy artillery groups and further refine the high-payoff target lists.

Finally, we identified trigger events and developed a decision support matrix. The matrix synchronized forces at H-Hour (time of attack) to **deliver** overwhelming combat forces deep; the purpose, destroy enemy regiments and artillery RAGs and DAGs during the dark of the night and amid the confusion of the initial artillery general preparation of the battlefield.

Intelligence assets used to support our IPB came not only from divisional units, but from corps and echelons above corps. These additional assets, to include national technical means, could range deep beyond the FLOT and accurately target the enemy's


OH-58Ds cross-FLOT
OH-58Ds confirm targets; AH-1s begin deep attack
AH-1s cross-FLOT
AH-1s arrive at holding area FOX; Scouts reconnoiter battle positions
AH-1s first engagement
AH-1s second engagement
begin egress
AH-1s and Scouts use forward arming and refueling points
2100
2200
2300
2400
0100
proactive division artillery strike (1 hour)
corps deep attack on corps and division artillery groups
suppression of enemy air defense fired
restricted fire area in effect
holding area FOX preparation and battle position complete
point suppression of enemy air defense for battle air interdiction
preplanned battlefield air interdiction (Forward Air Controller)
egress suppression of enemy air defense begins

The sequence of events illustrate

FIGURE 1: Deep Attack, Phase 1

artillery groups. We developed a battlefield calculus to estimate combat power ratios, which the CG used during his decision process.

Command and Control (C^2)

The C2 for the deep attack was centralized at the Division main (DMAIN) command post (CP). The Aviation Brigade commander decided early to co-locate the Brigade tactical air command (TAC) CP with the DMAIN CP during the deep attacks.

This allowed for interface with the joint targeting cell, Division FSE (fire support element), ALO (air liaison officer), A^2C^2 (Army airspace command and control element), and G2 (intelligence). The CG commanded the Division's deep attack from the DMAIN. The Aviation Brigade commander planned to command from a UH-60A Black Hawk going cross-FLOT during the **deliver** phase of the deep operations.

From planning through execution, detailed coordination of the employment of all the battlefield operating systems (BOSs) was fundamental to the mission. The Division joint targeting cell served as the focal point for gathering all BOS managers. This cell was key to coordinating and integrating all systems into the scheme of maneuver and fire support for the deep attack.

The G2, through his ability to manage the intelligence collection effort, enabled the joint targeting cell to accurately fix enemy artillery groups—especially long-range, 170mm (millimeter) howitzers.

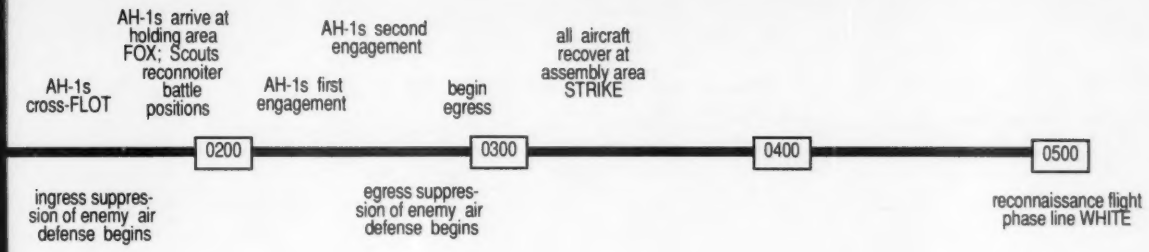
From coordinated IPB products, we established CCIRs (commander's critical information requirements). This enabled the CG to make time-sensitive decisions to engage high-risk, high-payoff targets.

Warfighter 91 challenged the CG to fight a numerically superior enemy across the entire width and breadth of the battlefield. This bridged the gap between current and future doctrine to synchronize deep operations at division level.

Synchronization

The joint targeting cell met in the DMAIN at 1400 and 0200 daily. The cell projected operations 36 hours into the future to synchronize attacks with the nomination of targets for the ATO (air tasking order) cycle.

The first priority for the joint targeting cell was to develop high-payoff target lists based on the IPB and current and future operational requirements according



the time lines developed to support the scheme of maneuver.

to the principles of METT-T. We used targeting spread sheets to rank targets throughout the Division's area of operations. Based on desired effects on high-payoff targets, we developed time lines for engagements and synchronization matrices.

Synchronization of the deep attacks was imperative to the success of the mission. Assets were aligned against required tasks with other combat systems and parallel tasks. The synchronization matrix was an ideal tool to assist our efforts.

We developed several time lines based upon the possibilities of reengaging RAGs and DAGs not previously reduced to 25-percent strength. We coordinated the time lines with the joint targeting cell and deconflicted both fires and airspace through the Division FSE and A^2C^2 elements. The events sequence shown in figure 1 illustrates the time lines developed to support the scheme of maneuver.

Battlefield Air Support (BAS)

One particular challenge was the integration of joint fires into engagement areas to completely destroy RAGs and DAGs. Doctrinal definitions of close air support and BAI did not adequately address the type of synchronized joint fires needed to achieve the desired effects on deep targets.

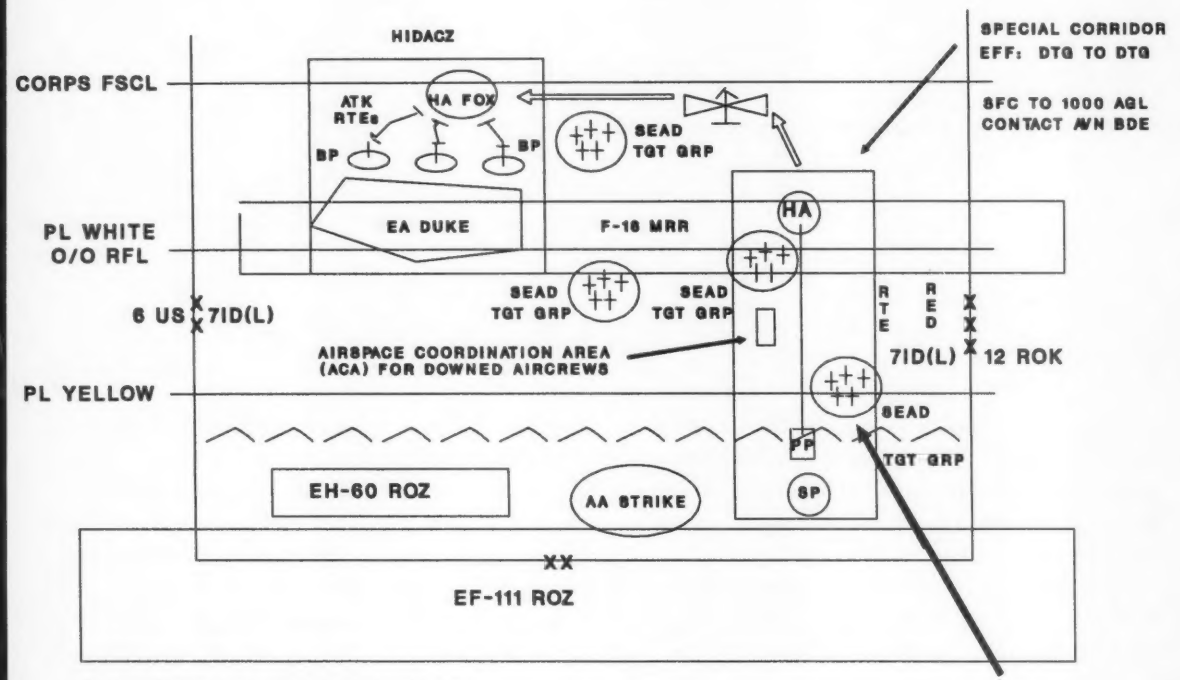
We needed to mass both ATKHs and USAF assets at the decisive time and place, synchronizing both timing and weapons effects. The types of controls and timing needed to synchronize the deep battle were in keeping with the BAS as defined in the ***TAC/ALFA Bulletin***, December 1991. We established a H-FAC (heliborne forward air controller) with the Aviation Brigade airborne CP to control synchronized BAS fires. Our concept was for BAS to strike a sector of EA DUKE with cluster munitions following the first engagement of the ATKHs. This action would strike the enemy while it was in the process of displacing, thereby maximizing mobility kills before the second engagement by ATKHs.

Electronic Warfare (EW)

The Aviation Brigade ALO served as the focal point for integration of USAF EW assets into the deep attack. Although corps denied our initial requests for EF-111 Raven and F-4G Phantom II assets, we adjusted our timing of the deep attacks to fly under the cover of

LEGEND

ACA	AIRSPACE COORDINATION AREA	HIDACZ	HIGH DENSITY AVIATION CONTROL ZONE	RFL	RESTRICTIVE FIRE LINE
AD	AIR DEFENSE	L	LIGHT	ROK	REPUBLIC OF KOREA
AGL	ABOVE GROUND LEVEL	MRR	MOTORIZED RIFLE REGIMENT	ROZ	RESTRICTED OPERATION ZONE
BP	BATTLE POSITIONS	O/O	ON/ORDER	RTE	ROUTE
DTG	DATE-TIME GROUP	PP	PASSAGE POINT	SFC	SURFACE
EFF	EFFECTIVE	RED	NAME OF AIR CORRIDOR	SP	START POINT
FSCL	FIRE SUPPORT COORDINATION LINE			TRP	TARGET REFERENCE POINT



Note: air defense weapons control status in special corridor "weapons hold"

FIGURE 2: Deep Battle Control Measures

pre-planned Corps-level offensive EW operations that would provide us residual EW support.

We specified EW targets in our BAS nominations and included organic EH-60 assets in our offensive EW plans. This structure would require EH-60s (QUICK FIX) to fly cross-FLOT with the ATKHBs (battalions) during the deep attacks. Then we could focus on electronic countermeasures (ECM) operations to protect our air corridors, particularly at the FLOT penetration points.

By correlating the Division and Corps USAF taskings/request time lines with our events sequence, we decreased the risks associated with the deep attacks.

Army Airspace Command and Control (A^2C^2)

We used an innovative technique to synchronize A^2C^2 with the deep attacks. Figure 2 depicts the airspace corridors and fire support coordination measures developed to sequence fires and protect the attack battalion as it crossed the FLOT. We had previously developed and published airspace corridors that traversed the entire battlefield from the DSA (Division support area) forward.

The Division FSE (fire support element) and the Aviation Brigade FSO (fire support officer) developed SEAD/JSEAD target lists. The target lists would support the corridors based upon a thorough analysis and targeting of suspected and known enemy ADA locations.

The Division G2 and Aviation Brigade S2 (intelligence) provided suspected S-60 and KS-19 (North Korean ADA guns) sites based on enemy Flat Face and Fire Fan radar activity. We would then update the SEAD/JSEAD target lists as intelligence required. The Division G3 Air (operations and plans) would then activate corridors to support our deep operations.

The SEAD/JSEAD fire support requirements would have previously been entered in the LTACFIRE (light tactical fire control) system; they would only require minor modifications because of changes in the enemy situation or specific flight routes. We conducted a thorough mission analysis and briefing our plan to our subordinate commanders.

Execution

After conducting a thorough mission analysis and briefing our plan, we were ready to execute what was to become a series of deep night attacks that effectively confused and paralyzed the warfighter OPFOR (opposing forces).

The counterartillery battle began with a general preparation of the battlefield by all available Divisional DS (direct support), GS (general support), and GSR (general support reinforcing) battalions and batteries. This included indirect fires to destroy templated and identified RAG and DAG locations within range of our artillery.

Under the cover of our massive preparatory fires, we fired the initial SEAD for the corridors to be used in a few hours by the ATKHB. In addition, we fired SEAD to support our efforts in the Division's deception operations.

We had assembled a small force of UH-1 Hueys with PSYOPs (psychological operations) loudspeaker teams to simulate a UH-60 Black Hawk air assault forward to the FLOT along the Division left flank. This portrayed that the Division's main effort was in the west. The OPFOR believed the deception.

Intelligence assets, including LRSU (long-range surveillance unit) teams inserted by UH-60s 48 hours before the attacks, confirmed the location of the RAGs and DAGs.

In addition, the G2 integrated Q-36 radars to located RAGs and DAGs as the enemy attempted to counter our massive artillery prep. The Division committed both of the OPCON (operational control) OH-58D Kiowa aircraft from Corps to confirm the exact location of the RAGs and DAGs and recon (reconnoiter) our flight routes, holding areas, and company battle positions.

As the OH-58Ds identified targets along the flight routes, we immediately handed the SALUTE (size, activity, location, unit, time, and equipment) reports to the assistant fire support coordinator (AFSCOORD) and G2 collection manager. The AFSCOORD then allocated or shifted forces to deliver effective and accurate indirect fires to destroy identified targets.

The Aviation Brigade FSO also had provided the OH-58Ds with a Quickfire channel for transmission of Copperhead missions. This communication was to maximize the laser designator systems available to the Division forward of the FLOT.

Once the OH-58Ds had positively identified the RAG and DAG locations, the CG could decide to

commit the ATKHCs (companies) along the eastern corridor to cross the FLOT at designated passage points at F-Hour (cross-FLOT penetration time).

The SEAD was initiated 15 minutes before the ATKH task force (TF) crossed the FLOT. Although the enemy correctly identified the massive air movement, the enemy incorrectly assumed this air movement was an air assault conducted to support the Division's main efforts in the west.

The primary EA was 18 to 25 kilometers (km) beyond the FLOT and out of range of all but multiple launch rocket system (MLRS) batteries. These MLRS assets provided preparatory fires on the holding areas and battle positions. BAI sorties and MLRS also hit the EAs just before the arrival of the OH-58Ds.

Upon arrival of the OH-58Ds in the battle positions, the Division established a RFL (restricted fire line) south of EA DUKE and a RFA (restricted fire area) encompassing the ATKH battle positions and engagement areas. The purpose was to protect our aircraft from friendly indirect fires.

Effective SEAD fires quickly overwhelmed the enemy ADA forces. The ATKH TF reached the deep holding areas and battle positions untouched. ATKHs arrived in the battle positions at H-Hour and conducted a battle handover with the OH-58Ds already on station.

Once in position, the ATKHs conducted a massed attack to destroy enemy RAGs and DAGs. After all ammunition was expended, the ATKHs were to sequence back to the holding area. In this area, cache UH-60 aircraft had been pre-positioned with additional Hydra-70, 2.75-inch MPSM (multi-purpose special munitions) and TOW (tube-launched, optically-tracked, wire-guided) munitions.

The OH-58Ds remained on station to keep eyes on the enemy artillery units as they attempted to displace. The OH-58Ds proved to be the ideal system for long-range night reconnaissance, using the thermal imaging sensor (TIS) in the mast-mounted sight (MMS) to detect targets up to 10 km away.

We sequenced the second of our BAS strikes to hit the EA during the break on station of the ATKHs. The H-FAC (heliborne-forward air controller) provided final control for the BAS assets as they dropped cluster munitions, seeking to destroy displacing enemy forces or to achieve mobility kills. Fire support provided JSEAD fires for the BAS assets as the BAS ingressed and egressed the EA.

We had planned for a second engagement in EA DUKE by ATKHs completing the destruction of the enemy artillery forces. This proved unncesssary based on our initial battle damage assessments. A reattack would have resulted in increased risks to keep our forces cross-FLOT for an extended period of time.

The CG decided to egress back to friendly lines after the first engagement and not to rearm deep for a second engagement as planned. Preplanned SEAD fires led the TF along a second corridor on the eastern flank. The OH-58Ds trailed the TF to call Copperhead fires to complete our destruction of enemy ADA assets and to designate for targets of opportunity.

Upon completion of the rearward passage of lines, we sequenced into multiple rearm and refuel sites and completed our restoration efforts while we awaited the CG's decision to reattack.

The CG decided against conducing a second deep attack because of the risk to his decisive maneuver force, the ATKHB. We had planned several branches to conduct the second attack including attacking with a second ATKHB that was being used to conduct rear operations and as the Aviation Brigade reserve.

Sustainment was based on normal resupply systems. We moved FARPs (forward arming and refueling points) closer to the FLOT to support a quick turnaround should a second attack be required. We also used UH-60s forward OPCON to the ATKH TF to sustain the operation while cross-FLOT. This included a Jump FARE (forward area refueling equipment) system capable of sustaining the OH-58Ds and providing emergency refuel if attack assets needed a few gallons of fuel for the return cross-FLOT flight. We provided each ATKHC with a cache UH-60 carrying Hydra-70 and TOW munitions, as well as arma-

ment personnel to assist in rearming forward in the holding area.

Lessons Learned

The Division's deep operations were an unqualified success. A LID won the counterartillery battle against a superior force using future AirLand Battle Operations doctrine as modified for division level.

We effectively reduced enemy artillery to 25-percent strength during our deep attacks. This enabled the infantry brigades to conduct infiltration attacks through the enemy's general security zone. We had disrupted the enemy's center of gravity and destroyed the continuity of this defense through bold and audacious deep attacks.

Although the enemy later would attempt to reinforce its artillery and defensive belts, we continued our deep attacks on successive nights and caught the enemy while he was displacing assets forward.

The Division continually used **decide-detect-deliver** methodology to conduct deep operations. The focal point was the joint targeting cell.

The Aviation Brigade was the Division's maneuver brigade for phases I and II of Warfighter 91, with decisive results. The Aviation Brigade also played a key role in the success of the counterartillery battle by providing the Division FSE with over 200 spot reports during 4 days of operations.

Intelligence is critical for developing and updating both high-payoff target lists and for SEAD. OH-58Ds were essential for our deep operations, particularly at night. Their FLIR system, combined with a laser designation capability, ensured the destruction of the RAGs and DAGs.

The integration of the Aviation Brigade TAC CP with the DMAIN was vital to synchronizing operations and conducting parallel planning for future deep attacks. The Aviation Brigade also provided the G2 and Division FSE with access to the Aviation Brigade command and O/I (operations and intelligence) nets. This access allowed them to have instantaneous spot reports of enemy activity during deep operations.

The Aviation Brigade S3, FSO, and ALO were critical members of the Division joint targeting cell. Key staff officers must coordinate early in the planning process if all players are to implement the commander's intent in a coordinated effort. The Aviation Brigade provided LNOs (liaison officers) to all of the maneuver brigades and the three divisional CPs (DMAIN, TAC, and DREAR) to better integrate Army Aviation into the Division's scheme of maneuver for all areas of the battlefield (deep, close, rear, reserve, and security).

The technique of pre-planning corridors forward of the Division rear boundary proved invaluable to future operations. The corridor system allowed us to develop a detailed plan for SEAD fires and to distribute necessary FSC measures to every division and MSC (major subordinate command) CP. The corridors were then activated to support specific aviation operations.

We developed corridors based upon our initial METT-T analysis and updated the SEAD plans and corridor activations based on changes in the enemy situation. Several corridors corresponded with MRRs (minimum risk routes) and LLTRs (low-level transit routes) used by the USAF. This allowed us to develop JSEAD and plans to support the overall attack.

Summary

Deep operations can be decisive for LIDs. Warfighter 91 established the Aviation Brigade as the combat maneuver force staffed and equipped to execute decisive deep operations for the 7ID(L).

We can create conditions for close combat operations by destroying the enemy's ability to bring his indirect fires to bear. We can seize and maintain the initiative while disrupting the enemy's decision cycle. We can create the conditions under which light infantry can defeat a numerically superior force while minimizing friendly losses.

As the Army transitions to AirLand Operations, the opportunities that such exercises as the BCTP provides will further help refine the way that we in the lightfighter division fight.

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PART 4: Army Aviation and the Counterfire Mission

This is the fourth in a series on force design and the warfighting capability of a force. This article focuses on the role of Army Aviation, in counterfire, which provides the force commander with an agile, flexible, and lethal alternate means to destroy, suppress, or neutralize enemy fire support elements.

For 500 years, artillery has endured as a powerful battlefield tool. In many wars, an advantage in artillery provided the margin needed for victory. In just as many wars, opposing commanders understood the terrible effects of indirect fire and actively sought to destroy their opponents' artillery.

Many professionals consider this historic battlefield struggle as uniquely the domain of the "artillery duel." Indeed, armies around the world invest heavily in counterbattery radars and rapid-fire direction computers to prosecute this fight. A survey of history, however, tells a different story.

FM 101-5-1 defines counterfire as "fire intended to destroy, neutralize, or suppress enemy indirect fire systems." This definition is appropriate in that it makes no distinction as to which weapon system to employ in the execution of this mission. Thus, the definition suggests that the execution of counterfire largely depends on the types of conflicts encountered and weapons available.

Furthermore, this definition does not specify what part of the fire support system is targeted nor when counterfire should occur. Army Aviation, through its ability to rapidly maneuver and then focus tremendous destructive power, provides the force commander with one more potential weapon to destroy his opponent's artillery.

It is necessary, however, to describe Army Aviation's potential role in counterfire in terms of the spectrum of conflict, the concept of "interchangeability of fires," and the impact of attacking the fire support "system of systems" over the course of a battle.

Examples of Counterfire Concepts

Historical precedent presents several relevant examples of different counterfire concepts.

☐ World War II (WWII)–Battle of France

During a critical phase in the Battle of France, German artillery became bottled up in traffic. A German infantry regiment on one of the corps' spearheads faced the difficult task of a river crossing in full view of the French artillery.

"Colonel Balck sent a liaison officer to corps headquarters to request maximum air support and to point out that the attack could not hope to succeed unless the French artillery was eliminated...the Stuka onslaught completely silenced the French artillery which never recovered from the blow.

"Colonel Balck had the impression that the crews deserted their batteries and could not be induced to go back to the guns. The complete cessation of French fire had a remarkable effect on the morale."[1]

This particular incident provides an example of the concept of "interchangeability of fires" (aircraft instead of artillery) in a high-intensity war. The important issue is that, when tube artillery is unusable for counterfire, for whatever reason, the commander expediently finds (or plans for) an alternative method to accomplish this mission.

☐ WWII—The 1945 battle for the Philippines

This battle provides a comparison between the unlimited use of artillery for counterfire in open terrain (Clark Field) and the restricted use of artillery for counterfires in urban combat (Manila).

"...fires in Manila had to be carefully controlled for reasons common to most urban battles. First, the population was friendly

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and it was desired to minimize civilian casualties, particularly since the city had not been evacuated. The intensive shelling of at least one Japanese strongpoint was halted when a large number of civilians were discovered."[2]

Counterfire missions from 155-millimeter (mm) howitzers amounted to 24 percent of the total fires provided in the Clark Field battle, but dropped to 4.9 percent when faced with the collateral damage restrictions imposed by the urban terrain of Manila.[3]

Restrictions to artillery use within Manila were compounded by the fact that air-delivered munitions were even more inaccurate—air bombardment of the city was prohibited throughout the battle. Within the confines of Manila, counterbattery fires were applied mainly by tanks, tank destroyers, and infantry teams operating as part of the normal clearing process.

Similar restrictions to tube artillery and nonprecision air bombardment may apply in future contingency missions and force the joint task force commander to seek other means or methods of defeating enemy artillery.

The preponderance of Soviet artillery in WWII virtually guaranteed that either tube or rocket artillery was used for a majority of Soviet counterfire missions. Massive counterfires and suppressive fires initiated 13 major Soviet campaigns from October 1943 through the fall of Berlin.[4]

☐ Vietnam conflict

Counterfire during the Vietnam conflict was complicated by the speed with which an enemy mortar crew could set up, fire a limited number of rounds, and then disappear into the cover of dense vegetation. Counterfire against this type of fleeting target was best accomplished by gunships responding to muzzle flashes or searching for potential firing positions—

"Most cavalrymen warmly recall their constant overhead nighttime surveillance of division base camps and firebases, watching the woodlines for mortar flashes."[5] Essentially, the speed with which a mortar could be set up, fired, and hidden was inferior to the speed with which an attack helicopter could apply counterfire.

During the Tet Offensive of 1968, the 1st Cavalry Division provided counterfire support to the defenders of Quang Tri. Several North Vietnamese Army (NVA) regiments advanced quickly on Quang Tri and found the city without adequate artillery support. NVA guns were massed in fire support "areas" and proceeded to pound the city under the cover of low ceilings.

In a short time, troopers of the 1st Cavalry conducted air assault landings on top of shocked NVA artillery units—

Is the historic battlefield struggle of indirect fire uniquely the domain of the "artillery duel"? The answer lies in the creative application of counterfire—the type of conflict encountered and type of weapons available—to provide the margin for victory.

"1st Battalion of the 12th Cavalry...executed its air assault into the middle of North Vietnamese heavy weapon sites. The helicopters carrying Company C skimmed low underneath the clouds and banked sharply to land the Skytroopers among the mortars, recoilless rifles, and AA [antiaircraft] machine guns of the NVA fire support center for the K-4 Battalion, 812th NVA Regiment."[6]

Much like the battle of Manila, the force commander needed to silence enemy artillery but, for different reasons, had no artillery or fixed-wing support of his own. Again, the concept of interchangeability emerges as the expedient solution.

Our recent conflicts have provided the best insights to the concept of "interchangeability of fires" and the use of the full combined arms team in the counterfire fight.

☐ Operation Just Cause

During Operation Just Cause and the fight in Panama City, Panama, for instance, the force commander imposed strict rules of engagement to reduce collateral damage. The laser-guided munitions used by attack helicopters and aerial fire support observers can—and did—accomplish the counterfire mission with one precisely placed round.

At one point during Operation Just Cause, a Panamanian 81mm mortar crew operated against elements of the 82d Airborne. If this one enemy mortar crew could have oriented its fire in the opposite direction, it could have engaged dozens of U.S. Air Force cargo aircraft waiting to unload at Howard Air Force Base, Panama.

If a majority of a contingency force were deployed by air into a forced entry situation, the early application of counterfire to secure the lodgement would be critical to the success of the mission. Aviation units deploying on the first sorties could conduct clearing, security, and counterfire missions until the lodgement grew large enough to put the air or sea terminal out of enemy indirect fire range.

☐ Operation Desert Storm

During Operation Desert Storm, we maneuvered numerous attack helicopter battalions against Iraqi artillery formations. The concern that the Iraqis would use chemical weapons certainly provided a powerful incentive to use every available element in the combined arms team to perform the counterfire fight.

Army helicopters were used to destroy relocatable Silkworm cruise missiles after both fixed-wing sorties and naval gunfire—other potential pieces of the "interchangeability of fires" concept–failed.

Army Aviation's Role in Counterfire

Many believe that counterfire is essentially a series of counterbattery duels between artillery systems. These historic examples suggest artillery can be complemented in the counterfire role by other combat assets, especially in lower intensity or nonlinear conflicts. The single, inescapable conclusion is that, in wartime, commanders will perform counterfire with whatever means work best—whether artillery, close air support (CAS), helicopters, or ground elements.

The role of Army Aviation in counterfire, therefore, is to provide the force commander with alternate means to destroy, suppress, or neutralize enemy fire support elements, as part of the normal interchangeability of fires that happens in every conflict.

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In addition, counterfire is easiest against fixed targets. It's hard to locate a moving helicopter. The mobility of the helicopter enhances its survivability against counterfire or counter-counterfire.

Army Aviation provides the force commander with several different means to impact the counterfire battle:

Attack helicopters can destroy any portion of the artillery "system of systems" by direct fire. On a nonlinear battlefield, attack helicopters can maneuver rapidly between scattered enemy units to destroy high-value, indirect-fire assets that pose a critical threat to the force commander's intent. Attack helicopters can destroy high-value indirect fire targets on a linear battlefield as well if that target is deemed critical to the success of the force.

Aviation also can assist in carrying out the counterfire mission through the aerial fire support observer role. On a nonlinear battlefield, the OH-58D Kiowa, AH-64 Apache, or the future RAH-66 Comanche can laser-designate targets for either copperhead or Air Force-delivered munitions such as Maverick.

This technique might have great utility during low-intensity conflicts. Whenever it is possible for an individual target to be laser-designated by an aerial observer, an individual round of ammunition can destroy that target. Laser-guided munitions preclude the need to fire whole artillery batteries or battalions in a counterfire fight.

An aerial observer can quickly locate in a spot and guide the impact of counterfire artillery, which cannot be viewed, in many instances, by a ground observer. The Army aviator can accurately place the desired fire on the enemy's artillery to render it ineffective.

The counterfire mission also may be accomplished by air-assaulting soldiers to locations from where they can attack, destroy, or neutralize the enemy's artillery. This is already a proven technique during low-intensity conflict.

In wartime, commanders will counterfire with whatever means work best—whether artillery, close air support, helicopters, or ground elements.

Conclusions

The first conclusion follows from this discussion:

Enemy fire support actually is a "system of systems" that includes the weapon system, resupply vehicles, repair assets, reconnaissance, and fire direction. Therefore, the definition of counterfire allows for the attack of any of these subsystems at any time.

Counterfire can, therefore, be directed against any portion of the enemy's indirect fire system at any time or location on the battlefield by any weapon system we choose. The evidence presented here points to the conclusion that counterfire is conducted by a variety of means and in a variety of ways, especially in lower intensity or nonlinear conflicts.

In wartime, commanders will perform counterfire with whatever means work best—whether artillery, CAS, helicopters, or ground elements. The role of Army Aviation in counterfire, therefore, is to provide the force commander with another means to destroy, suppress, or neutralize enemy fire support elements, as part of the normal interchangeability of fires that happens in every conflict.

A second conclusion might be that, while the concept of interchangeability of fires reflects the reality of the battlefield, it is not institutionalized in our own doctrine. The Soviets, for instance, have long written about the "interchangeability of fires" and the "interchangeability of fires and maneuver."

A third conclusion would be this: Army Aviation can bring flexibility and lethality to the combined arms fight. We anticipate a continuum of operations; counterfire in this continuum could pose a special need for innovations in acquisition, the attack of deep targets, and dealing with elusive relocatables, such as Iraq's SCUD (SS-1 SCUD Bs—Soviet mobile or fixed surface-to-surface) missiles.

Field artillery gains its critical agility by the range of its systems. Army Aviation has a different type of agility. While we cannot execute the dense fires associated with massed artillery, we can search and destroy elusive, mobile targets that pose a threat to the force.

Search for new and innovative ways to apply air maneuver across the battlefield operating systems. Each new method of applying helicopters to old tactical problems confounds the enemy—and provides one more way it can perish. Break the molds, expand the variety of missions, and you will bring exponential increases to the substantial lethality and versatility of the combined arms team.

ENDNOTES

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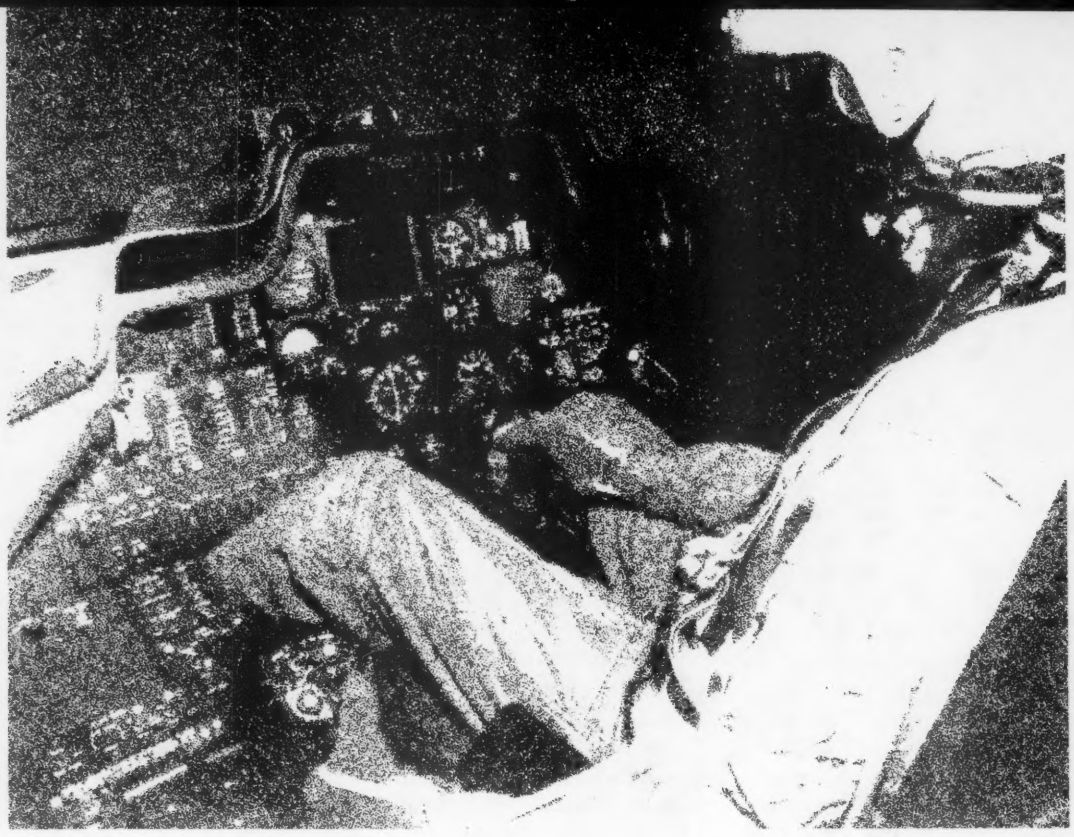

Gunfighters

Blazing guns and flying missiles fall, who's the best among them all? The second Howze Helicopter Gunnery Competition matched crews from every major command in the Army. The rivalry enhanced combat readiness and instilled excellence in training for the AH-64 Apache and the AH-1 Cobra.

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Guns started blazing and missiles began flying at high noon during Thanksgiving on the banks of the Choctawhatchee near Fort Rucker, AL. The best guns from all over the world came to town to lay claim on who was the best among them. All of the gunfighters walked away survivors, but only four flew away winners.

The second Howze Helicopter Gunnery Competition matched battle rostered crews from every major command in the Army. Competition used AH-64 Apache and AH-1 Cobra simulators at the U.S. Army Aviation Warfighting Center, Ft. Rucker, to test skills of each crew.

"We wanted to establish a competition that would enhance combat readiness and instill excellence in training for the attack helicopter crews from around the Army," said Colonel (COL) Michael Mehaffey, director of Tactics and Simulation (DOTS), Fort Rucker.

General Hamilton Howze (retired), godfather of U.S. Army Aviation, wanted to encourage a competition among aviators. He donated a silver Revere bowl as a challenge prize to be engraved with the names of the winning crews. Later, Rockwell International and the Wiregrass Chapter of the Army Aviation Association of America joined the Aviation Center, Fort Rucker, to support the event. They provided "take-home" trophies and other support.

The first helicopter gunnery competition was held at Fort Rucker in 1989. The AH-64 combat mission simulator (CMS) provided the medium for the competition. Crews flew a simulated mission and were scored on their ability to perform.

No competition was held in 1990 because a real-life gunnery competition was taking place in Southwest Asia. As crews finished redeployment, preparations began for the 1991 event.

Major commands invited to the 1991 event included U.S. Army Forces Command, U.S. Army Europe and VII Army, Eighth U.S. Army, and U.S. Army Pacific. National Guard and Army Reserve units were to compete as part of the units they deploy with during wartime. Each command would hold their own internal competition to select the best AH-1 and AH-64 crews to compete at Fort Rucker.

To prevent the forming of all-star crews merely for this event, commanders had to certify each competing crew as being battle-rostered. This means the crews trained together during the year or are being trained together to be battle-rostered. These crews would deploy and fight as crews during war.

"By using simulator-based competition, crews could fight a very elaborate threat array in a realistic, cost-effective, and safe environment in which each crew

The AH-64 Combat Mission Simulator provided a high-threat, reactive environment for the helicopter gunnery competition.

would be challenged to the limits of their ability,'' said Captain Doug Sutton, one of the competition's coordinators.

''There are some things that can actually be done better in the simulator than can be done on most ranges,'' he said.

The competition is based on a 1,000-point system weighted toward performance in tactical mission scenarios. All the crews are evaluated during a simulated mission on terrain navigation, communication, and target destruction.

By the performance of the participating AH-1 Cobra and AH-64 Apache crews and their feedback, training here earned an A plus, said Major (MAJ) Terry W. Teeter, chief of the Attack/Scout Division of the DOTS.

''We just don't come here to see who can score the most points,'' MAJ Teeter said during an after-action review with the participants. ''There has to be some training value,'' he added.

Comments from the competitors overall indicated the competition was intense and on the mark for what it is intended to do—promote combat readiness and instill training excellence.

The consensus among the participants was that the competition was realistic and demanding, especially the day and night combat missions conducted in simulators.

''They were tough missions, all in all. I mean it wasn't a cake walk by far,'' said Chief Warrant Officer (CW2) Ron Shipley, a member of the second-place Apache team from 2d Battalion, 229th Aviation Regiment, a Rucker-based element of the XVIII Airborne Corps, Fort Bragg, NC.

The simulator gave the crews an opportunity to test their mettle under combat conditions, said MAJ Teeter.

In the Cobra Flight Weapons Simulator and the Apache CMS, the crews flew realistic 1-hour day and night missions.

''It's a high-technology, real-time presentation reflecting current requirements of doctrine, tactics, techniques, and procedures,'' MAJ Teeter said. ''The competition events are designed to enhance combat readiness in aviation units and instill excellence in both 'schoolhouse' and unit training,'' he added.

CW2 Matt Thompson, Shipley's teammate from the 2-229th, said the CMS ''allows you to push yourself and the aircraft to the limit. You aren't able to do that during peacetime training.'' The crews were under pressure during the combat scenarios and that made coordination and communication between crew members even more important, said MAJ Teeter.

''We got a chance to learn how to divide our crew missions and break down our tasks under pressure. We have very good crew coordination and that helped us,'' said WO1 Jose Tejeda, 1/7, 1st Cavalry, Fort Hood, TX. He and his teammate, CW2 John Kercheville, won first place for the AH-1 Cobra.

Cockpit coordination was the hot topic during the after-action review.

''I learned that it is very important to success,'' said Cobra pilot First Lieutenant Jeff Kordenbrock, 4/2 Armor Cavalry Regiment, Nurenberg, Germany. He and Chief Warrant Officer Samuel Mercer finished seventh among the Cobra crews.

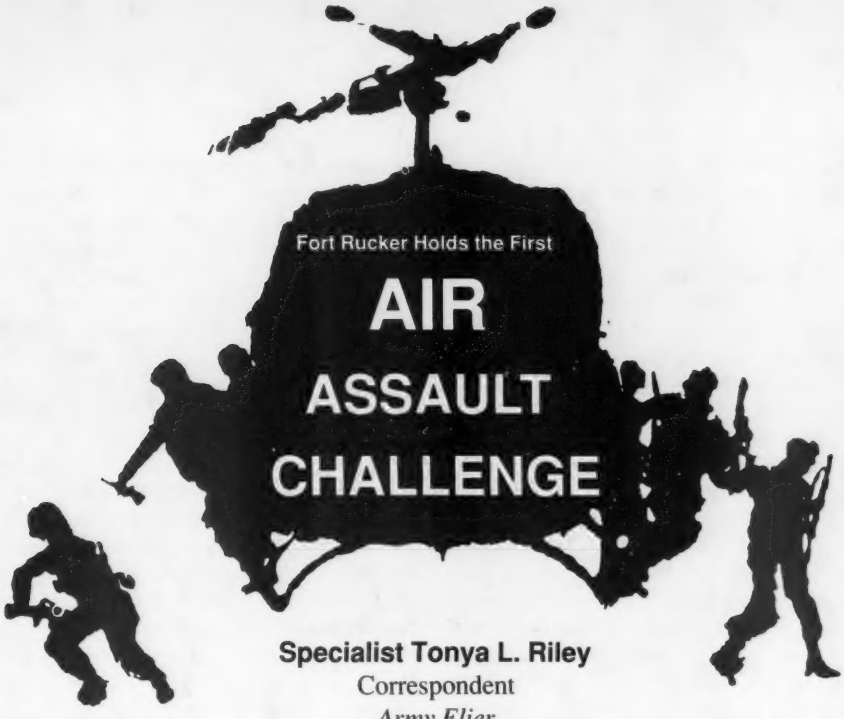
MAJ Teeter said the competition enhances a lot of things the crews already know. ''I think the competition went extremely well. We accomplished everything we wanted to do. I hope the crews go back to their units and spread the word that this is an event that people want to participate in,'' he said.

Besides planning and flying the simulated mission, crews must use their memories to pass written tests on gunnery skills, switchology, and threat identification. The new Aircraft Survivability Equipment Trainer II will be used to test pilots' knowledge of threat systems and how to defeat those threat systems. To do this, pilots will use aircraft survivability equipment or employ the proper tactics, techniques, and procedures.

''Cobra King'' CW2 Kercheville said the competition exposed one of his and WO1 Tejeda's weaknesses—threat identification.

''Our strongest suit is flying, but we are weak in threat identification,'' he said. ''It definitely showed what our weak and strong points were.

''The Howze competition is a tough, combat-simulated event, but we want it to be one event crews will fight to take part in year after year. We'll roll out the red carpet and will make it an experience worth bragging about,'' said COL Mehaffey.



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They came to be challenged.

The U.S. Army Aviation Center and the Fort Rucker Air Assault School, AL, hosted the first-ever competitive event called the Air Assault Challenge 20-22 November.

The 3-day competition was open to 30 two-soldier teams that were already air-assault qualified. Soldiers from any post, rank, gender, military occupational specialty, and age were eligible to compete in eight scored events.

First Lieutenant (1LT) Keith Brelia and his teammate, Sergeant (SGT) Robert Harris, Fort Rucker, won the competition by scoring 544 points out of a possible 621. 1LT Brelia is the commander of Company C, 509th Airborne Infantry (Pathfinder), 1st Aviation Brigade (Air Assault), Fort Rucker. SGT Harris is also a member of that command.

Taking second place with a score of 539 were local Aviation Officer Advance Course students: Captains (CPTs) Joseph Hicks and David Fee, Company F, 1st Battalion, 13th Aviation Regiment, 1st Aviation Brigade (Air Assault).

In third place with 492 points were 1LT David Monk and 2LT Bryan Monteith, Company A, 1st Battalion, 187th Infantry Regiment, Fort Campbell, KY.

Twenty-nine teams began the competition, 24 completed the challenge. Thirteen of the teams were from Fort Rucker, 13 from Fort Campbell. Fort Bragg, NC, sent two teams, while Hunter Army Airfield, GA, sent one.

On the first day, soldiers were welcomed and given a basic skills refresher course by the Air Assault School cadre.

CPT Robert D. Sewall, Air Assault School commandant, and the school cadre planned, set up, and scored the events.

The first scored event was an extended score Army Physical Fitness Test. SGT Christopher Crossley of Company C, 1st Battalion, 327th Infantry Regiment, Fort Campbell, won the 2-mile run in 11 minutes and 43 seconds. 1LT Brelia topped the sit-up portion with 106 and 2LT Monteith won the push-ups by doing 94.

As the soldiers completed each event, the school cadre posted each soldier's raw scores and each team's total points earned.

The second event measured the team's ability to mark a safe helicopter landing point quickly and accurately. The fastest team

wasn't the winner here—accuracy was important. For every 10 centimeters that the measurements strayed, 20 seconds were added to the team's time.

The third event was the Air Assault Obstacle Course. CPTs Hicks and Fee completed the course in 8 minutes, 45 seconds.

The last event of the day was the Swiss Seat Tower Run. Each team had to correctly tie a Swiss seat, run through about 40 yards of loose gravel, and climb stairs to the top of the five-story rappel tower. The team of SGT Carl Bullock and Staff Sergeant (SSG) Michael Irvin of the 502d Infantry Regiment, Fort Campbell, scored the highest with a total time of 2 minutes, 11 seconds. All the teams rappeled from the tower after reaching the top.

The next morning's activities began at 0500, with a 100-question written examination. The soldiers had 15 minutes to answer as many questions as they could.

In the next event, all the competitors formed into a large circle to do more than 100 hand-and-arm signals. They would all need to bring a helicopter into position to land or hover, pick up or insert a load of cargo or troops, and then depart the area. The contestants were to give the correct signal only at the command of the instructor. If they didn't wait for the instructor's command, or if they gave an incorrect signal, they were eliminated. The last team still giving signals was the winner. 1LT Brelia and SGT Harris won the event.

The seventh event was the Slingload Rigging Inspection. In that competition, four slingloads were rigged with "gigs" or mistakes. The teams had 2 minutes to rush from load-to-load and identify each error. The event was won by another team, Privates (PVTs) Michael Massey and Billy St. Clair, Company C, 509th Infantry, Fort Rucker.

The last event was the 12-mile foot march. "The foot march was grueling and the challengers had to be tough and competitive," said SSG Thaddis Williams, air assault instructor.

The soldiers marched through a constant downpour of rain, which made the sand heavier, ground slicker, mud deeper, and packs and clothes heavier.

LTs Monteith and Monk led the march with a finish time of 2 hours and 26 minutes.

SFC Donald P. Cogan, the school's senior instructor, was pleased with the challenge. "When we were told we could do it, CPT Sewall and I sat down and brainstormed about the events of the competition. We wanted the competitors to challenge themselves, their fellow soldiers, and the Army standards," SFC Cogan said.

CPT Sewall said the challenge was motivating for the school. "We are all competitors at heart down here. At every event, I wished I could be out there myself," he said.

The commander of the 1st Aviation Brigade, Colonel (COL) Robert B. Bailey, said, "The cadre did a fantastic job. They are the backbone of the school, like noncommissioned officers are the backbone of the Army—a real credit to the corps."

While visiting the competition site, COL Bailey said of the competitors, "Everyone here is a winner. It is so good to see soldiers motivated to come out for this kind of challenge."

LTC Bert Lennon, commander of the 1st Battalion, 10th Aviation Regiment, 1st Aviation Brigade, said, "We want this to be the beginning of a tradition, like the Ranger competition. It's not good enough to just be a good air assault soldier anymore. Now there is a new standard, a new challenge—the Air Assault Challenge."

TOP 10 TEAMS IN THE AIR ASSAULT CHALLENGE

POS	TEAM	UNIT	SCORE
1	1LT Keith Brelia and SGT Robert Harris	Co C, 509th Inf, Fort Rucker, AL	544
2	CPT David Fee and CPT Joseph Hicks	Co F, 1-13 Avn, Fort Rucker, AL	539
3	2LT Bryan Monteith and 1LT David Monk	1/187th Inf, Fort Campbell, KY	492
4	SGT Russell Faulkner and SGT Paul Whisler	Air Assault School,Fort Campbell, KY	466
5	PVT Michael Massey and PVT Billy St.Clair	Co C, 509th Inf, Fort Rucker, AL	456
6	SSG Kevin Irwin and SPC Joseph Carberry	Co B, 1/58th Avn, Fort Bragg NC	414
7	SPC Kenneth North and SPC Aron Piazza	HHC, 2/327th Inf, Fort Campbell, KY	405
8	1LT Nelson Emmons and SGT Daniel Fierro	Co C, 3/187th Inf, Fort Campbell, KY	380
9	SSG Robert Arendt and SGT Rodney Crowder	Co C, 509th Inf, Fort Rucker, AL	366

ARMY AVIATION

A Branch Founded by Dreamers and Doers

Brigadier General Robert A. Goodbary
Assistant Commandant
U.S. Army Aviation Center
Fort Rucker, AL

The following speech was presented by Brigadier General Goodbary to graduates of Initial Entry Rotary Wing (IERW) Course, Classes 91-11, -12, and -13.

We are here today to honor those who are about to officially receive "their wings"—silver wings that represent nearly a year of hard work, long hours, and intensive study. These wings are also representative of a long, silver line of Army aviators stretching back almost 50 years.

When I was first asked to speak today I thought a long time about what I'd like to say. You and I are a generation of aviators apart. I am nearing the end of my career while you are just beginning yours. What interests all of us? I thought of telling you about the future of Army Aviation, or where we are going as a Branch. I decided instead that

I would talk about where we have been as a branch of dreamers. And then I'll pass the torch to you.

Wake up, I want to talk to you today about dreaming.

Some of you out there are probably thinking to yourself, "The General must have had one hard landing too many," but please hear me through.

Henry David Thoreau (American philosopher of the 1800's who was known for his back-to-nature movement and Walden Pond) could have been talking to Army aviators when he said, "If you have built castles in the air, your work need not be lost. They are where they should be. Now put the foundations under them." Thoreau was talking about dreaming when he said this, and I believe he was right on target. Successful people in this world are dreamers who are also doers.

Professor Thaddeus S.C. Lowe's dream was to use balloons, like the Intrepid, for observing and reporting Confederate troops' positions during the Civil War.

Success comes to people who aren't afraid to dream and to people who are not afraid to stand up and fight for their dreams.

You might think the military, and in particular the United States Army, would be an unusual place to find dreamers. But to tell you the truth, we didn't have to look far at all. General Douglas MacArthur said, "A good soldier, whether he leads a platoon or an Army, is expected to *look* backwards as well as forward. But he must *think* only forward."

Forward thinking or dreaming led to sending aerial observers up in balloons. Thaddeus Lowe believed in using his balloons as spotting platforms during the Civil War. Lowe was an innovator as well as a dreamer. Using written messages at first, he could report on enemy troop formations. Later, he incorporated the telegraph to speed communication. The ground commanders didn't like having this first aviator on their battlefield, but he gave them excellent and timely battlefield information. It's good to know some things don't change very much.

Lowe and John LaMountain even used barges as launching platforms during some battles. Perhaps the Navy should credit the Army with developing the first aircraft carrier.

Standing up for your dreams is also important. An example of that sort of dreaming and tenacity comes in the person of one of the first Army aviators, General Billy Mitchell. Although the Air Force tries to claim Billy Mitchell as one of theirs, let the record be set straight once and for all, Billy Mitchell was a part of what, in 1919, was known as the United States Army Air Service. Now in that service I want you to all note that Army comes before Air.

Back then, Mitchell argued that airpower would make battleships obsolete in future wars. Mitchell knew it could be done. He worked with

Army ordnance engineers to design the bombs that would be carried by his aircraft. He trained his pilots to attack in waves. Finally, Mitchell knew a direct hit was not necessary to sink a battleship. A close hit by a large enough bomb would create the concussion which would break open the hull. He had done his homework.

In a demonstration of his dream, Mitchell sank three captured German battleships with his aircraft. No sooner had the unsinkable *Graf Spee* settled on the ocean floor, Mitchell was lobbying the American press on the importance of airpower. The Navy never forgave him. Mitchell recognized the utility of the third dimension and championed its importance.

Aviation Branch, *your* Branch, was founded by dreamers. Igor Sikorsky solved the problems of torque and dissymmetry of lift with his VS-300. Army visionaries saw potential in the frail aircraft and, in 1942, Colonel (COL) Frank Gregory accepted the first R-4 Hoverfly on behalf of the Army. On the way to Gregory's acceptance, one observer called it a flying windmill. Those windmills would ultimately change the way the Army fought its wars.

Two years later, in April 1944, Lieutenant Carter Harmen flew an R-4 600 miles into Northern Burma to rescue downed, fixed-wing pilots and crew stranded in an inaccessible jungle area. Operating out of a small clearing and using some very skilled piloting techniques, Harmen was able to overcome the high altitude and low engine power to bring out the four men. The dream that culminated in Harmen's rescue and evacuation exploits would be echoed many times over during the next four decades.

As the Korean War engulfed that peninsula, Army helicopters expanded their role as Angels of Mercy. Bell 47 helicopters became known in the Army as OH-13 Sioux. Soldiers rigged some OH-13s with litters to evacuate casualties from the battlefield. Before these MEDEVAC [medical evacuation] aircraft arrived, transporting wounded to a hospital could take 10 to 14 hours, meaning many soldiers died en route. The OH-13s reduced the evacuation time to less than 1 hour

Igor Sikorsky demonstrated his dream through the capability of his VS-300, which solved the problems of torque and dissymmetry of lift in aircraft.

after being hit. Scores of soldiers owed their lives to the helicopter.

In the late 1950's, Army dreamers saw the need to transition from piston engines to turbines in helicopters. They understood piston engines were at the limit of their power output. You are flying a descendant of their efforts. Bell helicopters flew the civilian equivalent of the UH-1A Huey in 1956. The Army purchased the Huey in the late 1950's. The ability of the new turbined-powered aircraft to move squads of soldiers improved Aviation's support of the ground commander. Several iterations later, and in some cases, different *generations of pilots*, we are still flying, training, and fighting with the UH-1 series.

Men and women helped in the evolution of the helicopter as the single most important piece of equipment on the battlefields of today and tomorrow. COL Jay Vanderpool believed that helicopters could be used as gun platforms. He and a small group spent Sundays at Mattison Range developing that capability in secret because the Key West Agreement of 1948 didn't allow the Army to have armed aircraft. If Vanderpool had not followed his dream, who would have destroyed the Iraqi radar sites so the F-117s could bomb Baghdad?

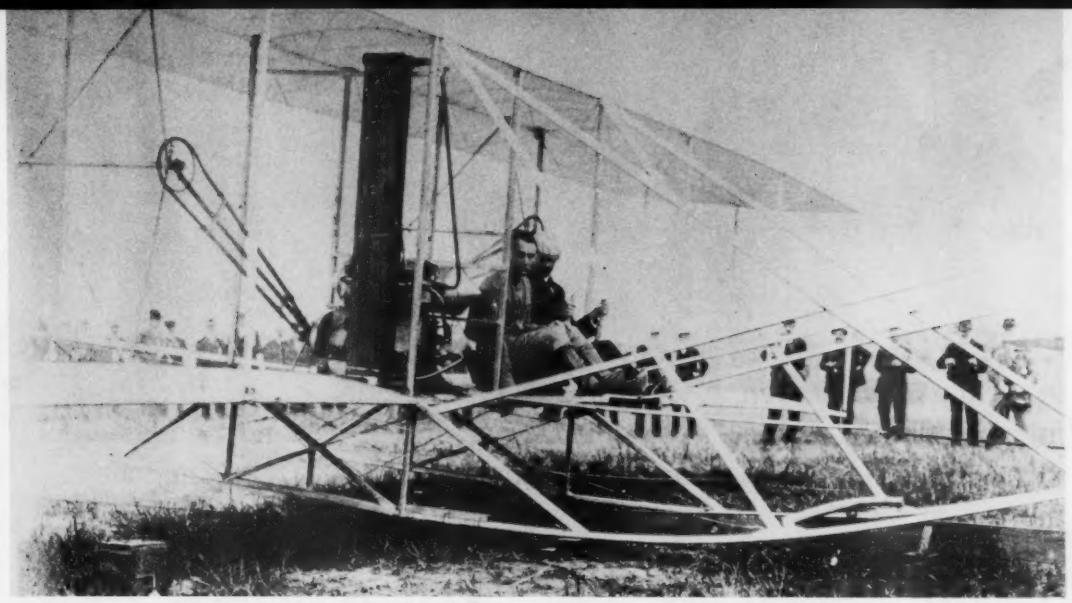
General Hamilton H. Howze had a dream about the future of Army Aviation. He directed the Howze Commission to evaluate the use of helicopters in terms of airmobility during the North Carolina maneuvers in the mid-1960's. The success of those tests led to the proud traditions of the 1st Aviation Brigade and 1st Cavalry Division during Vietnam.

During the 1980's, other Army Aviation dreamers saw the need to develop Aviation and improve its capabilities. Major General Don Parker oversaw the doctrinal development that would expand the airmobility role of the UH-60 Black Hawk and the attack capability of the AH-64 Apache. General Parker's dream of an Aviation Branch, an Aviation School with basic and advanced courses for its officers, and the wholesale revision of Aviation doctrine with Fort Rucker as the proponent, came to fruition beginning in 1983. His vision of Army Aviation's role as part of the combined arms team was validated during Operation Desert Storm.

Lieutenant General Parker envisioned that Army Aviation should be a separate branch and followed through on making his dream a reality.

In 1900, two bicycle mechanics in Dayton, OH, dreamed of being the first to fly in a heavier-than-air machine. Wilbur and Orville Wright read all they could on other aviation pioneers to find a starting point. The Wrights decided they needed to do three things to achieve their dream of heavier-than-air flight: Develop an efficient airfoil to *achieve* flight, find a light but powerful engine to *sustain* flight, and integrate movable surfaces to *control* flight.

In their quest for an airfoil, the Wright brothers discovered that the previous research on airfoils was based on faulty data. So they began to experiment with airfoils and create their own data tables. They didn't have enough money to build a wind tunnel so they began with a bicycle-mounted device to show which of two wings was more efficient. Their experiments led to relationship tables on chord length and camber. With the results, the Wrights built wings for their gliders.



The Wright brothers flew repeatedly in their glider to achieve their dream of heavier-than-air flight.

The Wrights' next step was to find an engine strong enough but light enough to get the aircraft into the air. After finding no engine that would meet their requirements, they cooperated with a mechanic named Charlie Taylor who developed a 140-pound, 12-horsepower engine.

Translating that horsepower into usable thrust was their next challenge. In designing their propellers, the Wright brothers hoped to transfer technology from ship and boat screws. They discovered Naval research on the subject was more art than science. They again developed their own calculations on propeller design. They simplified the problem slightly by using a pusher rather than puller prop.

The last area had to do with aircraft control. The Wrights flew repeatedly in their gliders learning more than anyone else. They learned by doing. Their aircraft control was based on warping the wing to increase or decease lift. As they learned more about turning aircraft in flight, they discovered the phenomenon of sideslipping. Since no one had ever gotten this far before in aircraft control, the Wrights were again on their own. Their solution was a movable vertical rudder tied into the pilot's hips.

In 1903 the Wrights were able to put all their discoveries together. On 17 December 1903, the Wrights turned their dream into reality.

Three lessons can be derived from the Wright brothers' experiences in changing their dreams into reality.

- ☐ First, know how to get your dream off the ground.
- ☐ Second, make sure your dream has all the power it needs.
- ☐ Finally, learn what it takes to control your dream.

Ours is a Branch of dreamers and doers. From your generation will come the Wrights, Mitchells, Howzes, and Parkers of the future. We have given you the ticket to learn more as an Army aviator. I hope we have also given you a ticket to dream. You have fulfilled one dream—start another. Be the dreamers and doers our country needs. That's my challenge to each of you this morning.

Good luck and safe flying.

Thank you very much!

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The Tactical Army Computer

The Tactical Army Combat Service Support Computer System (TACCS) enhances information management and improves combat effectiveness

Captain Douglas D. Sena
Project Officer
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

Some time ago, the Army committed itself to provide data automation equipment to tactical units. The intended trade-off reduced personnel authorizations for increased information management capabilities. This trade-off allows more fighters and less clerks.

Today, the Army accomplishes this commitment to tactical units in two ways: fielding Tactical Army Combat Service Support Computer System (TACCS); and acquisition of other commercial computer systems through the automation offices of individual tactical units.

The TACCS, a capable and sound computer system, is available to tactical units. The TACCS has many capabilities to give a tactical advantage to combat and combat support units.

These capabilities include word processing, printing, and transmission of operations orders. The most significant limitation with the TACCS, however, is inadequate training at the user and leader level.

Capabilities

Computers work faster and make less errors than people, saving people a lot of work and time.

However, computers are not smarter than people and they depend on programmers and operators. Automation systems accept data, process data, and yield results.

Originally, managers and executives believed computers would greatly increase the capability to process and manage information. The belief was so strong, they expected a significant reduction in required manpower. In part, this prediction proved true; however, the time to manage the same amount of information is significantly less.

This capability also creates the capacity to efficiently and accurately manage more and more information. This vicious cycle feeds upon itself, resulting in a dependency on computers with only a partial reduction in manpower requirements.

Prematurely, the Army reduced the authorized level of clerical manpower. Then the Army discovered automation equipment does not produce all of the promised decrease in workload. Luckily, trained operators, if available, can bridge this gap.

In today's Army, the use of automation equipment, such as computers, is commonplace in the day-to-day functions of almost all tactical units. Automation equipment greatly influences garrison operations of units down to the battalion level. The Army adapted TACCS from a commercial family of workstations.

The TACCS assists in accomplishing combat service support (CSS) missions. These CSS missions include maintenance, transportation, supply, medical, and personnel.

One computer program currently available to tactical units is the Standard Installation Division Personnel System (SIDPERS) for personnel applications. In addition, the TACCS comes with commercial software.

This software performs the standard computer functions of word processing (WRITEone); spreadsheet applications (Multiplan); compiling and running programs; data transfer to other computers; converting code files; and preparing and printing reports.

TACCS is available in two basic versions. Most tactical units have the basic system, the V1. This basic TACCS contains a monitor, keyboard, printer, and logic module. The V2 version contains an additional monitor, a keyboard, and a remote power supply.

The TACCS includes a 67-megabyte hard disk; 5.25-inch, double-sided, high-density floppy disk drive; 24-megabyte tape cartridge drive; and megabyte of master memory. The TACCS security systems include protection from electromagnetic interference and protection against interception of any stray electromagnetic transmissions.

The printer is a bidirectional, dot matrix printer. Operators select draft or near-letter quality fonts and character sizes from a series of switches on the back of the printer.

Soldiers must operate the TACCS in shelters, such as buildings, vans, or tents. In any case, the TACCS requires 120 volts at 60 hertz or 220 volts at 50 hertz. Operators can set the computer to automatically blank out data on the video screen after a given time to prevent "image burn" on the monitor.

Desert Storm has shown the requirement how TACCS should communicate to other computers: telephone, FM (frequency modulated) radio, local area network, field wire, a special network, or a digital secure voice terminal. Computer operators can connect the TACCS to other computer systems, including another TACCS, through the data communications circuits in the master workstation.

Operators can create personalized user files for use with the TACCS commercial software. Anyone can sign on the TACCS system: merely complete the date on the sign-on screen and press the "GO" key. This places the operator in the computer system's generic user file. Ultimately, one can create subdirectories, called user files in TACCS language.

When an operator with a personalized subdirectory signs on the TACCS, the system automatically accesses the user files in that subdirectory. At the very least, units can create several personalized user files, such as S1, S2, S3, S4, and executive officer. These files provide separate work areas for the differet staff functions that use the commercial software capabilities of the TACCS.

The TACCS automation experts within the division and corps can help to create these user files. Aviation units can write the Department of Tactics and Simulation, Fort Rucker, AL, for a copy

of the "Computer Systems" reference text and practical exercises numbered 52-1992-18.

These handouts are excellent tools for an operator to learn about these files and the WRITEone word processor. This author highly recommends the use of these handouts to supplement field training on the TACCS.

The word processor, a highly capable and underused information management tool, is available to units having a TACCS computer system. Although designed for field use, the TACCS requires a little more power than a couple of "D" cell batteries.

The problem with field-generated power is its poor reliability. The word processor WRITEone overcomes this problem with a protection package to prevent lost work hours. This protection allows WRITEone to recover almost everything but the last few keystrokes.

Limitations

The Army considers most commercial computers as installation property, because the equipment cannot withstand the environmental hardships of the field. Installation property is generally nondeployable.

Therefore, tactical units must function with significantly reduced automation capabilities when deployed to the field. The lack of garrison-related paperwork relieves units from some work normally associated with information management systems. If properly trained TACCS operators are available, they can cover these remaining requirements. Unfortunately, such individuals are difficult to find.

Although an individual can physically damage a computer, nothing harms a computer during normal operation. Programmers can reload software, thereby retrieving lost programs and saved data. Exceeding the acceptable operating temperature range or exceeding the nonoperating environenvironmental limits may damage the equipment. The acceptable temperature range is +33 to +110 degrees Fahrenheit (F). The nonoperating environmental limits are -25 to +150 degrees F.

Furthermore, placing a transistor radio close to the TACCS can damage the electronic data. The only authorized tools for operator maintenance are the operator's hands. A qualified technician must perform any type of component exchange or repair. Technical Manual 11-7010-213-12 can help individuals locate troubleshooting flow charts, codes, and routine preventive maintenance charts.

Realistically, SIDPERS clerks can use the TACCS only for a few hours a day. This leaves the TACCS available for many hours of non-SIDPERS use.

Staff officers can create operation plans on any standard word processing program with their installation International Business Machines compatible computer equipment. They can also electronically down load the information in ASCII format, a common computer language, and then upload the information to the TACCS.

Then at the proper time, staff officers can easily change the operations plan into an operations order, print multiple copies, and distribute them. The staff officers can do all of this in a tactical environment.

To use this translation capability, units must submit a DA Form 17 requesting the "B20 MS-DOS 2.11 version." Users can write to Commander, U.S. Army Information Systems Software Command, ATTN: ASBI-CDR (TACCS), STOP C-12, Building 1491, Fort Belvoir, VA 22060-5456.

Commanders should also include a request for the following manuals: WRITEone word processor, Multiplan spreadsheet, workstation graphics, printer operations, and operator.

Besides tactical word processing, staff officers can transmit the entire operations order by secure wire or radio. They can print copies at a new location in a matter of minutes. Unfortunately, these capabilities are virtually unexplored because of the severe lack of field training.

Conclusion

Commanders must encourage staff officers to receive training on the many possible uses of the TACCS. This provides a significant boost in a unit's capability to manage information in a tactical environment. With improved training, the unused capabilities of the Army's TACCS can provide commanders with meaningful improvements to their unit's combat effectiveness.

This is a welcome sight in these days of austere Modified Tables of Organization and Equipment within the Army of Excellence.

Air cavalry reconnaissance missions during Desert Storm matched the optics on the AH-64 Apache against the environment of the desert.

Apache Armed Reconnaissance Operations

Another Technique

Lieutenant Colonel William H. Bryan
Commander

Captain Michael A. Albaneze
Battalion Fire Support Officer

2d Battalion, 229th Attack Helicopter Regiment
(Flying Tigers)

Fort Rucker, AL

During the recent conflict in Southwest Asia, AH-64 Apache units conducted traditional air cavalry reconnaissance missions. The primary reason was to take advantage of the optics on the Apache in a relatively flat desert environment.

The 2d Battalion, 229th Attack Helicopter Regiment (ATKHR), was attached to the 101st Aviation Brigade, 101st Airborne Division (Air Assault), Fort Campbell, KY, for Operations Desert Shield and Desert Storm. This task organization gave this Air Assault Division two Apache attack battalions for combat operations.

The unit conducted zone, area, and route reconnaissance missions from "G Day" minus 7 (G-7) to G Day minus 2 (G-2). These missions were designated as "armed reconnaissance." Any enemy encountered might have to be engaged and destroyed for the division's air assault to establish a forward operating base (FOB).

Area of Operations

Figure 1 shows the division area of operations in the XVIII Airborne Corps sector for G-7 to G-Day operations into Iraq. Not long after occupying the tactical assembly area (TAA), the attack battalions began to conduct border reconnaissance at night.

When the predicted G-7 date drew near, the division gave new instructions to conduct armed reconnaissance missions: the 1-101st Aviation Regiment (Avn Regt) (AH-64) was designated as the "night" attack battalion and 2-229th ATKHR was the "day" Apache attack battalion. The 2-229th ATKHR maintained an attack company in reserve to support the 1-101st Avn Regt (AH-64) at night, while the 3-101st Avn Regt (AH-1) (Cobra) remained ready to conduct daytime operations.

The 2-17th Cavalry Squadron conducted route reconnaissance of the main supply route (MSR) to FOB Cobra after the zone had been cleared by the Apaches. The optics and auxiliary tank configuration made the AH-64 the logical choice to conduct deep armed reconnaissance missions.

Figure 2 shows the division phase lines up to the proposed FOB Cobra. From 14-17 February 1991, the 1-101st Avn Regt (AH-64) began conducting night zone reconnaissance missions into Iraq. On 17 February, the 2-229th ATKHR conducted a daylight zone reconnaissance up to Phase Line Charger and area reconnaissance of the proposed FOB

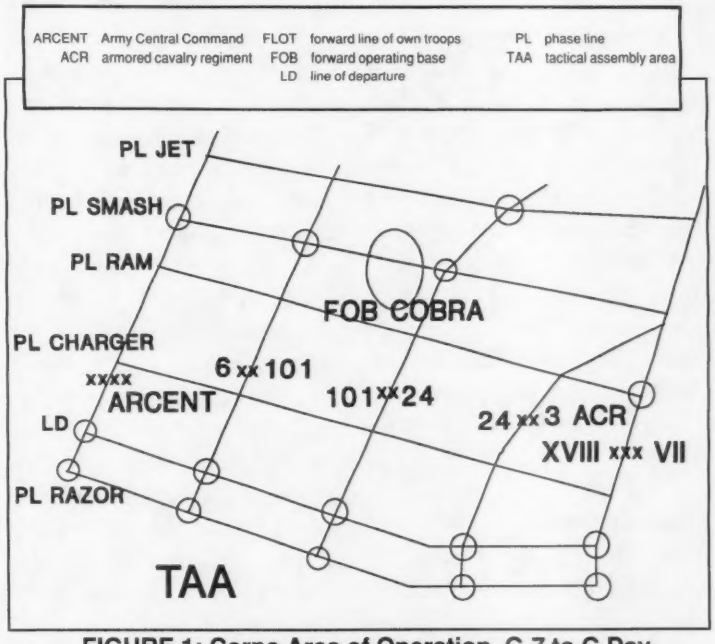


FIGURE 1: Corps Area of Operation, G-7 to G Day

Cobra site. These missions continued until G-2.

Situation

The intelligence section had plotted several enemy locations that showed no activity upon inspection. The 1-101st Avn Regt (AH-64) night reconnaissances had shown no enemy in sector.

Some personnel were spotted under the pilot's night vision sensor, but were deemed to be Bedouin nomads, an unique breed of people roaming the country. The 101st Aviation Brigade commander wanted to be absolutely certain of what lay between the TAA and the proposed FOB Cobra site.

The brigade required certain information: the condition of the landing zones at Cobra; suitability of the air control points (ACPs) for the air assault; and the trafficability of the MSR leading into the FOB. The greater visibility of daylight and the better quality of videotaped reconnaissances during daylight prompted the decision to conduct daytime armed reconnaissance missions.

Methodology

Because the 2-229th ATKHR did not have the benefit of darkness to conduct its reconnaissance missions, the traditional method of a "low and slow" zone reconnaissance was rethought. The armed reconnaissance operations not tipping off the Iraqis about the size or intentions of friendly forces was critical to the division commander. The enemy could have easily acquired a slow, probing AH-64 reconnaissance in daylight hours.

The missions were too deep for traditional aeroscout coverage with the Apaches. Additionally, the unreliability of intelligence reports clearly showed that an alternative method for conducting daylight armed reconnaissance was necessary.

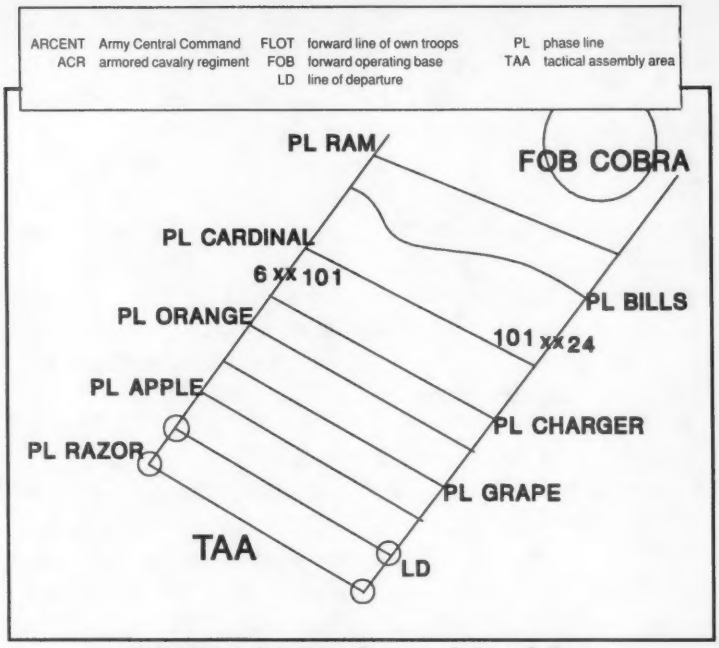


FIGURE 2: Division Sector, G-7 to G Day

Zone Reconnaissances

By flying in wingman teams, the battalion made sure it conducted the reconnaissance in depth and maintained the security for the team. Each company used two wingman teams to conduct the zone reconnaissance missions.

The company would fly low and fast, directly to the designated phase line for the mission. The company then worked the zone reconnaissance, zigzagging towards friendly lines and optimizing the optics on the Apache (figure 3).

The idea of flying back to front, instead of front to back, was for several reasons: de-

ceive the enemy if the aircraft were spotted heading into Iraq; catch them "looking the wrong way" on the way back to friendly lines; and take advantage of battle positions being oriented towards Saudi Arabia.

The zone was actively scanned on the route inward so the battalion could cue what might have to be thoroughly reconnoitered when working back to the forward line of own troops. By doing "reverse reconnaissance," the battalion hoped to attack the soft "underbelly" and lower our vulnerabilities.

Area and Route Reconnaissances

Area reconnaissance of the proposed FOB Cobra site and the air routes into it were similar. The company with this mission flew straight to the proposed site, 150 kilometers from the TAA. One aircraft landed and obtained global positioning system (GPS) coordinates.

The company commander recorded the missions and narrated the videotape to increase their intelligence value and facilitate higher headquarters review. The battalion videotaped the ACPs and updated the GPS coordinates.

Summary

On 17 and 20 February 1991, the 2-229th ATKHR, as part of the 101st Aviation Brigade, encountered an Iraqi border guard platoon and a light infantry battalion in bunkers, respectively. The battalion in bunkers was engaged by the 2-229th ATKHR and 3-101st Avn Regt (AH-1). Both encounters yielded Iraqis surrendering to aircraft.

The two locations where enemy prisoners of war were captured were only visible during the day because the dug-in bunkers were well camouflaged and blended with the natural landscape. Human body heat sources under the ground are difficult for the forward looking infrared to distinguish. Daylight reconnaissance made the unit more vulnerable, but also highlighted enemy locations as well.

The battalion must use the standoff capability of the Apache as much as possible during the day. Daylight armed reconnaissance missions against unknown or light forces are not impractical with AH-64s. Instead, these missions require a thorough application of mission, enemy, troops, terrain, and time (available) and a review of techniques for the teams.

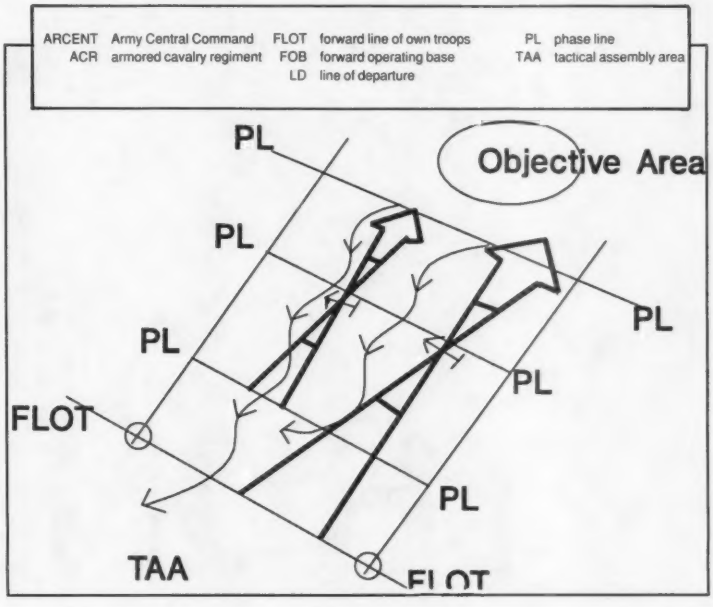
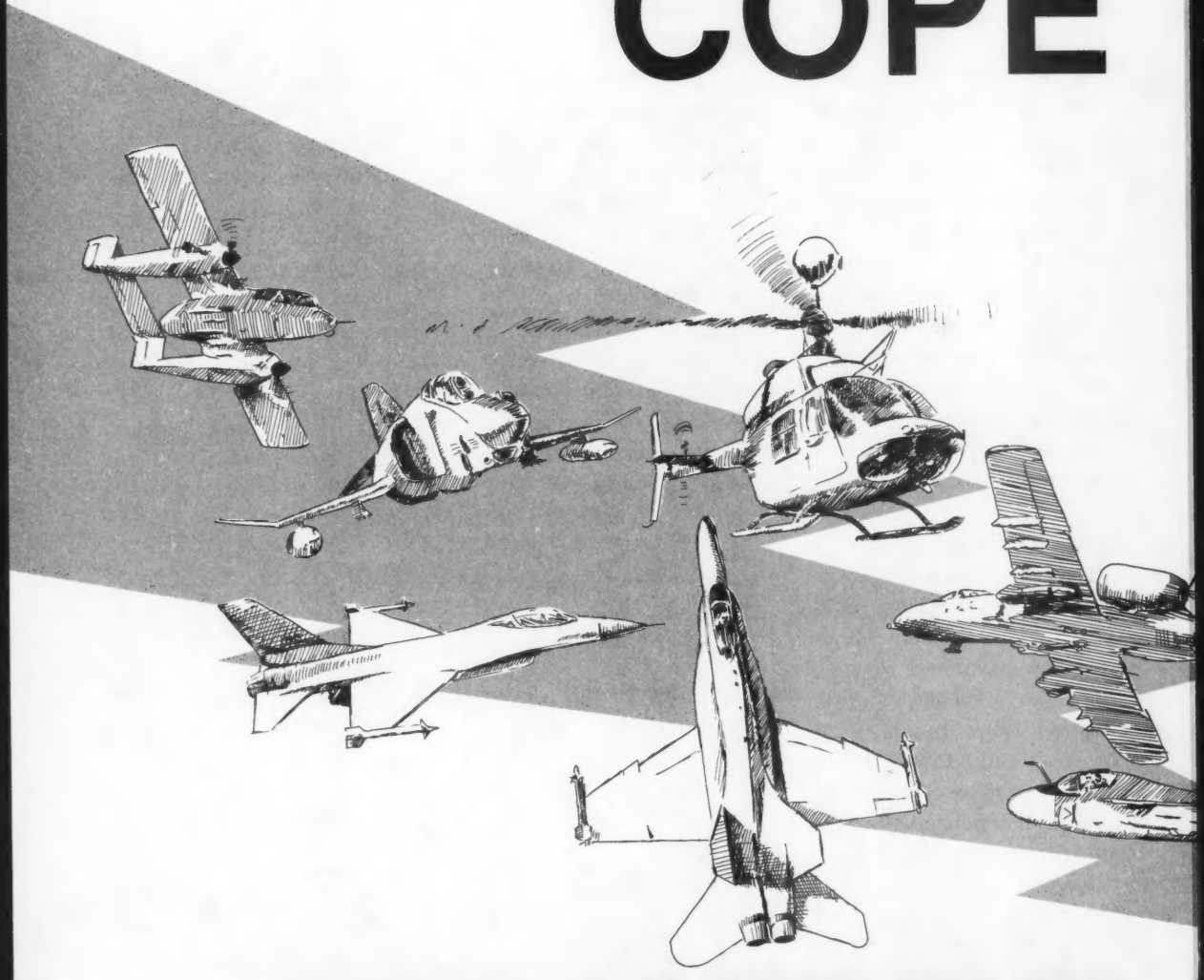


FIGURE 3: Reverse Reconnaissance Technique

COPE



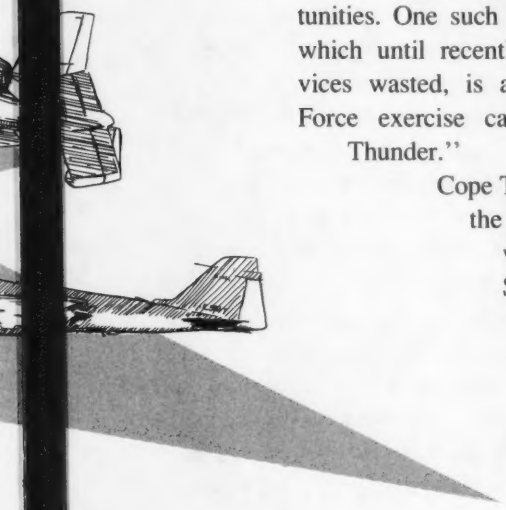
THUNDER

A JOINT TRAINING OPPORTUNITY

OH-58 Kiowas from the aviation brigade, 2d Infantry Division, Korea, and other defense aircraft participate in the Air Force's major exercise, "Cope Thunder." Results: A greatly enhanced training exercise to increase communication between the Army and Air Force.

Modern AirLand Battle doctrine calls for close coordination between the U. S. Army and the U. S. Air Force to provide maximum firepower on enemy positions. Unfortunately, neither the Army nor the Air Force devote adequate time or energy to train and rehearse for firepower, one aspect of our doctrine.

Commanders should take advantage of joint training opportunities. One such opportunity, which until recently both services wasted, is a major Air Force exercise called "Cope Thunder."



Cope Thunder is to the Air Force what "Team Spirit" is to the Army. Cope Thunder is a large training exercise involving numerous Air Force, U.S. Navy, and even U.S. Marine aircraft from all over the Pacific Theater.

Seven times each year, aviation units meet at Clarke Air Force Base (AFB) in the Philippines and stage a mock air war. Each Cope Thunder emphasizes one of the Air Force's primary missions.

Aircraft included the F-4 Phantoms, A-6 Intruders, F-18 Hornets, F-16 Falcons, OA-10 Wart Hogs, 0V-10 Broncos, and for the first time, two U.S. Army OH-58 Kiowas. The 0H-58s, along with five pilots and two crew chiefs, came from the aviation brigade of the 2d Infantry Division, Korea.

The Air Force chose to include the Kiowas in this Cope Thunder, realizing the difficulty in training close air support (CAS) and joint air attack team (JAAT) operations without the aid of Army aircraft. The result of their inclusion was a greatly enhanced training exercise and an increase in understanding and cooperation between the two services.

Differences in terminology, equipment, and procedures were all obstacles the Army aviators faced. After the first morning flight briefing, for example, the Army aviators felt lost.

What were chattermarks, wods, tods, and tads, and who was Micky? In time, Army aviators found these were all simple terms used to describe the radio frequencies and settings for

First Lieutenant Frank W. Tate
Aviation Officer Advanced Course 1991
Fort Rucker, AL

the day. Throughout the exercise's 10-day span, unfamiliar acronyms and slang continued to arise. The Army aviators, however, quickly learned to talk to the Air Force in Air Force lingo.

Another communication problem occurred in the air. The Air Force is fond of using the Have Quick frequency-hopping ultrahigh frequency (UHF) radios to defeat enemy jamming attempts. Although the Army aircraft had the latest Have Quick II radios, none of the aviators could operate them in the frequency-hopping mode.

The Army is transitioning to the single-channel ground-and-airborne radio system (SINCGARS) frequency modulated (FM) radios for its frequency-hopping ability. Therefore, they do not stress the frequency-hopping ability of the Have Quick UHF. A few short lessons on the ground from an Air Force pilot quickly remedied that problem.

In no time, the Army aviators were programing their UHF radios and speaking with ease to the jets overhead. This is one communication skill the Army aviators took back and taught their units in Korea.

Cope Thunder is not just an exercise in interservice communication. The tactical training is outstanding as well. The Air Force equipped the Crow Valley range facility north of Clarke AFB with realistic surface-to-air missile and antiaircraft artillery simulators and communication jamming capability. The Air Force also built life-size bamboo targets resembling aircraft on runways, tanks, and other enemy vehicles.

The jets dropped live training bombs that contributed to the realism of the exercise. The size of the operation also contributed to the outstanding training experience for the Army aviators. On a given day, each aviator could expect to control at least five separate CAS missions and simulated JAATs. This repetition led to a high degree of proficiency.

Even the deployment to and from Cope Thunder was a valuable experience. However, placing small Army aircraft on large Air Force aircraft was not without complications. For example, the crews had to disassemble, weigh, and mark the helicopters. They also built ramps, developed load plans, and inspected the aircraft.

All the lessons learned on this small deployment apply to large deployments and will greatly aid any officer. The advantage is the soldiers and airmen gained the experience and learned lessons without a major deployment expense.

The inherent differences between the Army and Air Force frequently cause confusion on the battlefield. The only way to eliminate that confusion before combat is to train together.

Both Army and Air Force must know and understand the operating procedures, capabilities, and limitations of the other. Training exercises, like Cope Thunder, provide the perfect opportunity for each to learn about the other.

Today's commanders must make every effort to capitalize on such exercises. Failure to cooperate and share training facilities and experiences will reduce efficiency and combat capability when most needed.

USAASA Sez

Military Training Routes

by Mr. John McKeeman

You are in the training area and not everything is working right, but training is going according to plan. The UH-6O Black Hawks have just dropped their troops and are departing the landing zone when an F-16 Fighting Falcon streaks through the area at what seems like 1,000 knots! The incident upsets the crews, and the leaders are trying to figure out how this could happen after all the careful planning they had done for this exercise.

The problem is that the exercise planners did not consider the military training routes (MTRs) that transit the training area. These routes are provided to accomplish military training at speeds of more than 250 knots and at altitudes below 10,000 feet.

One of the two types of MTRs is conducted under instrument flight rules (IFR) (IFR MTRs or instrument rules) and the other, under visual flight rules (VFR) (VFR MTRs or visual rules). These routes are published on sectional aeronautical charts and described in the *Department of Defense Flight Information Publication AP/1B, Area Planning, Military Training Routes, North and South America.*

Looking at the AP/1B, you will find a complete description of the MTRs to include the originating/scheduling activity, the hours of operation, the geographical points of each segment, the altitude limitations for each segment, the route width, special operating procedures, and the flight service stations, within 100 nautical miles, that have current information. Some routes allow terrain-following operations by the fast movers such as the F-16.

Exercise planners need to be aware of these routes and take them into account. Planners should start by looking at the sectional aeronautical chart for the training area. They should see if any MTRs cross through that area, then look at the AP/1B to decide if the route segment altitude will affect the exercise being planned.

The best plan is to avoid the MTRs, if possible, either geographically or by altitude. Confliction also can be avoided by scheduling, since some routes are not in continuous service. The contact for the scheduling activity and the times of use are listed in the AP/1B.

Good planners must consider all hazards that could interfere with a training exercise. MTRs may seem like innocuous lines on a map, but they pose some definite hazards to Army operations.

Mr. McKeeman is chief of the Airspace Support Division, U.S. Army Aeronautical Services Agency, Cameron Station, Alexandria, VA

U.S. Army Aeronautical Services Agency

USAASA invites your questions and comments and may be contacted at DSN 284-7773/7984 or write to: Commander, U.S. Army Aeronautical Services Agency, ATTN: MOAS-AI, Cameron Station, Alexandria, VA 22304-5050

Heavy Equipment Transporters

by Captain Horace E. Williams
and
Mr. Larry E. Wollenberg

The highly successful "Hail Mary" maneuver during Operation Desert Storm can be attributed, in part, to those oversized, lumbering heavy equipment transporters (HETs). The HET reduced fuel consumption and spare parts usage on our combat tracked vehicles.

In a division alone (24th Mechanized) are 241 M1A1 tanks, 221 M2/M3 armored fighting vehicles, 72 M109 howitzers, and 9 multiple launch rocket systems. If not for HET vehicles, each of these tracked monsters would have had about 500 miles to travel just to get into position for the ground attack.

That journey would have resulted in 500 miles of wear on the tracks, wear and tear on parts, and a heavy burden on fuel resupply. The HET is a critical element in the overall logistics plan of a deployment like Desert Shield and a combat operation such as Desert Storm. The HET also is capable of transporting aircraft.

Long before these operations came about, the Army was looking ahead for a modernized version of a transporter to move its heavy tracked vehicles. In July 1979, the U.S. Army Logistics Center, Fort Lee, VA, personnel analyzed equipment transporter requirements. Using this analysis along with a battlefield recovery and evacuation study, the Center's analysts concluded that tactical movements of armored forces on the battlefield would increase the HET's future workload.

To meet this challenge and the main battle tank's future transportability requirements, the Army recognized that the existing transporter (M747) had to be modified to accommodate 70 tons or a new transporter system had to be procured. At the same time, in a separate acquisition strategy, the M1070 tractor was to replace the prime mover (M911 tractor).

In April 1986, the Army completed 10 months of technical feasibility testing and evaluation at Yuma Proving Ground, Yuma, AZ, using semitrailers equipped with steerable axles. The introduction of a steerable axle system to the semitrailer alleviates many wheel, tire durability, and breaking problems encountered in previous models. The Army received approval to obtain commercial, nondevelopmental item trailers for HETs in January 1987.

The U.S. Army Test and Experimentation Command (TEXCOM), Ft Hood, TX, received two separate requirements to conduct an Initial Operational Test and Evaluation for the tractor and the transporter. Since the two items were part of one system, the two tests were combined into one.

A test team from the TEXCOM Engineer and Combat Support Systems Test Directorate conducted the test at Fort Hood, TX. It required 30 military occupational specialty-specific soldiers in the grades of private first class to platoon sergeant. The participants, from the Corps Support Command of III Corps, Fort Hood, TX, were primarily drivers and mechanics who had received 2 weeks of training on the new equipment. After a 48-hour pilot test to certify that the operators, maintenance personnel, and data collectors could perform their assigned tasks, the operational HETs test began.

During the 120-day, 24-hours per day, 5-days a week test, both disabled and fully operational main battle tanks and other oversized vehicles were loaded, transported, and unloaded day and night during various weather extremes.

Looking to the future, a special 70-ton Abrams tank was included in the test. Each of the three HETs involved in the test traversed 12,000 miles to satisfy data collection requirements. The operational tasks included 39-percent line haul (missions of 100 plus miles) and 61-percent local haul (30 plus miles). As they become available, real-world missions will be performed.

HET driver rewinds recovery cable after loading a disabled M1 Abrams tank on the trailer.

For an operational test of equipment such as HETs, the instrumentation used to collect data is small. Each vehicle is equipped with a hub odometer that measures miles travelled and a vehicle performance recorder that records tractor revolutions per minute, break pressure, vehicle speed, and suspension pressure.

The instrumentation provides facts on how long, how far, how hot or cold, and other technical data. The drivers and mechanics provide the critical data about the performance of the vehicle.

The high-tech instrumentation took a back-seat to clipboards, stubby pencils, and the gut feeling of the soldier who was there "where the rubber meets the road." Truck drivers and mechanics are probably the most outspoken soldiers in the Army when it comes to what works, what does not work, and what improvements need to be made.

Data collectors recorded the soldier's responses to specific questions and their unsolicited comments. TEXCOM data reduction specialists were responsible for taking the raw comments from the soldiers and entering this information into computers for analysis. The results of the analysis eventually will be used as a data point in the final report.

After the 120-day primary test, a final phase of special events is scheduled to run 4 24-hour days. This phase has cross-country fording in 28 inches of water, slope testing, and tactical decontamination processing.

All the operational test data will be evaluated and combined with other data, such as technical testing. After this procedure is done, a recommendation will be made to decision makers about procurement, type-classification, and addition to the Army inventory.

CPT Williams and Mr. Wollenberg are assigned to the TEXCOM Engineer and Combat Support Systems Test Directorate at Fort Hood, TX.

Test and Experimentation Command

Readers may address matters concerning test and experimentation to: Headquarters, TEXCOM, ATTN: CSTE-TCS-PAO, Fort Hood, TX 76544-5065

A Diet For Enhanced Aviator Performance

by Major Charles A. Salter

For how many aviators does breakfast consist of doughnuts and a soda? How many aviators skip lunch or just grab a chocolate bar from the nearest candy machine? Most aviators do not realize that such dietary habits can not only impair their long-term health, but also immediately affect their mood, alertness, and performance in the air.

The differences sometimes may be subtle or very slight, and they may not affect everyone equally. However, the dedicated aviator wants to achieve the highest performance possible, overlooking no opportunity for possible improvement. The dietary principles discussed below can help aviators enhance and prolong their ability to fly at maximum effectiveness.

Food Provides Fuel for Energy

The most obvious requirement for stable and alert performance is a steady supply of energy. The human brain depends on energy in one key form—glucose or so-called "blood sugar." Aviators who skip a meal before heading to the cockpit may deprive their brain of a sufficient supply of energy. Pilots who would never dream of taking to the air without fueling their helicopters, similarly, should take care to fuel their bodies.

Carbohydrates. The type of fuel an aviator eats is another important consideration. It is not enough to stock up on simple carbohydrates—sugary foods such as doughnuts, Danish pastry, or heavily sweetened cereals. True, such foods provide energy; however, sugary items lead to a surge in the level of sugar in the blood. The body responds by secreting insulin, which quickly drives blood sugar into fat and muscle cells. This insulin response typically drives blood glucose to levels below what it was before eating the sugary food.

Plummeting glucose levels trigger more hunger. So, a high sugar (and high calorie) breakfast may lead to overeating during coffee breaks or later meals, which further increases the calorie load and expands the waist.

Paradoxically, then, high sugar foods soon may lead to a reduction of energy in the blood supply to the brain. This energy reduction can cause a feeling of weakness and light-headedness when the aviator least needs it. By contrast, complex carbohydrates—fresh fruit, vegetables, and whole grain products—tend to provide a longer and more stable supply of energy to the brain. In short, your preflight meal should not include presweetened and other sugary foods and cereal, fruit, coffee, tea, etc., to which sugar has been added. A preflight meal should include complex carbohydrates such as fresh fruit, fresh vegetables, and grain products (unsweetened cereals, breads, and pasta).

Besides breakfast cereals, other overprocessed, packaged foods deserve a special mention. Before selecting such items, you should read the nutrition label found on most packaged foods. This label lists the ingredients

used in food production, starting with the one dominant in the product and proceeding in order of decreasing amounts included.

You should watch for the various terms that denote sugar, including words ending in "ose" (fructose, glucose, maltose, sucrose, etc.), syrup, honey, starch, or dextrin. Many processed foods include three, five, or more types of sugar, making the combined sugars the most prevalent part of the product. Such foods should be avoided before flying.

Protein. Protein contains an amino acid (tyrosine) that helps beef up brain chemicals (neurotransmitters such as norepinephrine) associated with improved performance. The Massachusetts Institute of Technology researched the effects of nutrients on behavior. The results showed that, 1.75 hours after eating a high protein meal, subjects showed significant improvement in simple reaction time when compared to eating a high carbohydrate meal.

During a study conducted at the U.S. Army Research Institute of Environmental Medicine at Natick, MA, researchers administered pure tyrosine, or a placebo, to 27 soldiers. When given tyrosine, the soldiers did better on several cognitive tasks, such as coding and arithmetic addition; had faster reaction times; and had improved moods when compared to their performance after consuming a placebo. (Pure tyrosine, of course, is likely to have stronger effects than the same amount of tyrosine received after eating a normal meal.)

Conversely, other studies, including some by this author, suggest that a meal too high in carbohydrates, with no protein, often makes people sleepy, and sometimes slows their reaction times and lowers their overall performance. Such research confirms the hazards of excess simple carbohydrates. It suggests a high protein meal can increase aviator attention and vigilance, enhance performance endurance, reduce reaction time, and aid in stress tolerance. The preflight meal, therefore, should include protein.

High Fat Content in Protein Foods

The problem with many protein foods, however, is that they contain too much fat. This is particularly true of animal protein foods, including meat, eggs, whole milk, and cheese. Steak, for example, is often considered a high protein food. It does contain plenty of well-balanced protein. However, up to 56 percent of the calories in steak comes from fat. Similarly, a regular hamburger patty provides about 66 percent of its calories as fat.

Even careful removal of visible fat from meat leaves plenty of fat, at the cellular level, which is invisible. Enough fat remains in a trimmed steak, for example, that amounts to one-third of the calories. Such foods make it difficult to keep your total dietary fat under the 30 percent maximum amount recommended by the American Heart Association and most nutritionists.

Excess Dietary Fat —A Triple Whammy

First, excess fat in a meal slows down the digestive process. Dietary fat keeps more blood tied up longer in the digestive tract, instead of the brain or muscles, which possibly contributes to a sluggish and tired feeling. This could hurt flying performance.

Second, fat increases calorie intake, because it contains more calories than any other kind of food. Thus, excess fat can add to your weight problem.

Third, consumption of excess fat, particularly saturated fat found more in animal than vegetable foods, causes or worsens a whole host of health problems. Long term, it can contribute to clogging of arteries, heart disease, cancer, diabetes, and other diseases. In short, excess dietary fat can shorten your career.

Well-Balanced Preflight Meals

Some fat in the diet is okay; however, in the preflight meal,

beware of too much of the following protein foods with high-fat content:

- Whole milk and whole milk products such as cheese and yogurt. (Also avoid butter, which is all fat.)
- Fatty meats and processed lunch meats, sausage, etc.
- Peanuts and other nuts.

Instead, you should eat the following protein foods with low-fat content:

- Low fat and skim milk, reduced fat yogurt, cheese, and cottage cheese.
- Small amounts (3 ounces or less) of lean meat, poultry, or fish.
- Legumes (beans and peas). (**Note**: Some people experience gas problems with legumes. If you do, you can experiment with different types; e.g., green peas and string beans, until you find those that have less of this effect for you. Refrying beans also makes them less gassy, but do not add lard or other fat.)

You should avoid excess protein, because it can upset your balance of vitamins and minerals. To get enough nutrients—vitamins and minerals and carbohydrates and protein—the principle of dietary balance states that we should sample foods from each basic food group each day. So, the aviator daily should eat up to—

- two to three servings of protein foods,
- two servings of milk products,
- four servings of vegetables,
- three to four servings of fruits, and
- seven servings of grain products.

Ideal Preflight Meals

Putting all this together, an ideal preflight breakfast might include—

- whole grain cereal with skim milk;
- whole wheat toast or muffin with little or no butter/margarine and jelly;
- an egg or serving of beans; and
- a quarter of melon, a banana, or another piece of fruit.

An ideal preflight lunch might include—

- vegetable soup or salad;
- a sandwich of whole-grain bread, sliced chicken breast or water-packed tuna (3 ounces or less), lettuce, and tomato (no mayonnaise or other condiments);
- skim milk to drink; and
- a piece of fruit for dessert;

An ideal preflight dinner might include—

- whole wheat bread or dinner rolls, plain;
- a small portion (3 ounces or less) of lean meat, poultry, fish, or vegetarian combinations (i.e., beans and rice, macaroni and cheese, bread and peanut butter, etc.);
- tossed salad with little or no dressing;
- fresh fruit for dessert; and
- water to drink.

Summary

I must admit that meals such as these are not exactly gourmet treats, but you can use herbs and spices to jazz them up. You also can use creativity in varying the food combinations and styles of preparation. Further, one need not eat every meal as described here. But preflight meals such as these can help aviators reach and maintain peak levels of flying performance. Do yourself a "flavor," eat right to fly right.

MAJ Salter is chief of the Crew Life Support Branch, United States Army Aeromedical Research Laboratory, Fort Rucker, AL.

Office of the Aviation Medicine Consultant

The Aviation Medicine Report is a bimonthly report from the Aviation Medicine Consultant of TSG. Please forward subject matter of current aeromedical importance for editorial consideration to U.S. Aeromedical Center, ATTN: HSXY-ADJ, Fort Rucker, AL 36362-5333

Aviation Personnel Notes

The Army Aviation Personnel Plan

Army Aviation has a complex and evolving mission as a member of the Combined Arms Force. Army Aviation requires highly qualified personnel to maintain, operate, and employ its assets. The Aviation Proponency Office (APO) performs long-range planning for the Aviation Branch to meet the required manning levels dictated by the mission. The formulation of the Army Aviation Personnel Plan (A^2P^2), as well as its continual evolvement, is the mission of the APO.

The APO works with the U.S. Total Army Personnel Command to forecast requirements and ensure they are met. The A^2P^2 was conceived in July 1986 to provide the Aviation Branch with a master plan to meet those personnel requirements.

The A^2P^2 is an evolving and proactive plan intended to manage the personnel of the branch to meet current and projected requirements and missions on the airland battlefield. This plan is meant to incorporate the eight personnel life cycle functions of structure, accession, professional development, individual training and education, distribution, unit deployment, sustainment, and separation under one plan.

The eight life cycle functions are complex individually. However, to successfully manage these functions, it must be recognized that they are interdependent. If each is managed independently without due consideration to the impact on the other function areas, then the branch and Army will not have the needed number of aviation personnel in the proper mix (commissioned officers, warrant officers, noncommissioned officers and enlisted) with the required training and capability to execute missions on the airland battlefield.

The structure of Army Aviation (the number of and type of units as well as the personnel requirements for each) is in a constant state of change. Each change in the structure creates reductions or increases in personnel requirements both in numbers and in skill qualifications. The training required to provide qualified aviation personnel in the proper mix of ranks and skill levels is expensive in both dollars and time. Using the A^2P^2 with the Army Aviation Modernization Plan (AAMP) enables the APO to project personnel requirements for effective long-range planning. One example is the recent reduction in accessions into full or overstrength military occupational specialties (MOSs) or ranks (structure). This reduction in accessions eliminates or reduces the expenditure of training assets (individual training and education) and provides career development opportunity to those already in the military occupational specialty (MOS) or rank. It also lessens the possibility of a requirement for a mandatory reduction in force (separation).

To receive a copy of the A^2P^2 or for inquiries about personnel trends in Army Aviation, you can contact the APO at DSN 558-4313 or commercial 205-255-4313 or write Commander, U.S. Army Aviation Center, ATTN: ATZQ-AP, Fort Rucker, AL 36362-5035.

Revisions for Military Occupational Specialties 93C and 93D

Recently, the APO submitted a request to revise the duties, qualifications, tasks, duty positions, titles, and standards of grade authorization for military occupational specialties (MOSs) 93D and 93C. The revision

authorizes the association of additional skill identifier (ASI) F7 (Pathfinder) and ASI Q8 (Tactical Air Operations) with MOS 93C. It also authorizes ASI B6 (Radar System AN/FSQ-84 Repairer) and 7C (Radio Transmitting Set AN/FRN-41 Repairer) with MOS 93D.

The Office of the Deputy Chief of Staff for Personnel, Headquarters, Department of the Army, approved the recommendation. When the memorandum of authorized change is published for Army Regulation 611-201, soldiers may submit training requests through their major Army commands.

The revisions were necessitated by development of the L-series tables of organization and equipment for air traffic control units. The revisions will provide more flexible air traffic services to all aviation units.

Green Tabs

The Aviation Proponency Office receives many questions about who may wear combat leader identification. Army Regulation (AR) 670-1 has one approved change that affects aviation leaders.

AR 670-1, paragraph 28-20a, reads, "The combat leader's identification will be worn by leaders of Category I (organization TOE specifies category: Armor, Infantry, Combat Engineers, Field Artillery, Air Defense Artillery, and Attack Helicopter [Aviation] units) Active Army, Army National Guard, and U.S. Army Reserve organizations, plus corps and division commanders of Category II organizations, the majority of whose subordinate elements are category I units." The regulation identifies the specific leaders.

The approved change deletes the words Attack Helicopter and the brackets around Aviation and leaves ". . . Air Defense Artillery, and Aviation units) . . ."

AR 670-1 does not authorize all aviation unit leaders to wear the green leadership tabs. It authorizes Category I aviation unit leaders to wear the green leadership tabs.

According to AR 570-2, there are three categories of units—Category I—Combat Units, Category II—Combat Support Units, and Category III—Combat Service Support Units. The first page of your unit modification table of organization and equipment identifies unit categories. The most common Category I aviation units are the cavalry squadrons and attack battalions. Most assault battalions are Category II aviation units.

Aviation Proponency Office

Readers may address matters concerning aviation personnel notes to: Chief, Aviation Proponency Office, ATTN: ATZQ-AP, Fort Rucker, AL 36362-5000; or call DSN 558-5706/2359 or commercial 205-5706/2359.

U.S. Army Class A Aviation Flight Mishaps

	Number	Flying Hours	Rate	Army Fatalities	Total Cost (in millions)
FY 91 (through 31 December)	10	365,817	2.73	9	$ 33.2
FY 92 (through 31 December)	5	346,267 (estimated)	1.44	4	$ 20.2

ATNAVICS Is On The Way!

by Sergeant Major James Wilson

The U.S. Army Training and Doctrine Command (TRADOC) approved the Organization and Operation plan, now called the Mission Needs Statement, for the Air Traffic Control (ATC), Navigation, Integration, and Coordination System (ATNAVICS) on 18 September 1991. This officially started the process to replace the aging AN/TSQ-71B Landing Control Central. It will provide precision and nonprecision approach and landing capability to tactical Army airfields and landing areas.

The AN/TSQ-71B is an airport surveillance radar/precision approach radar, ground-controlled approach (GCA) facility consisting of the AN/TPN-18A radar and a vehicle-mounted shelter containing the radar indicators and communications. Division, corps, and theater airfields use the AN/TSQ-71B to provide a precision approach capability. The equipment is 1950s technology. It started life as the AN/TPN-8. In the 1960s the AN/TPN-8 was modified to the AN/TSQ-71, which upgraded the radar to an AN/TPN-18 and modified the vehicle-mounted shelter. There also was a combined tower/GCA version, the AN/TSQ-72, but few remember it, and there is only one still in use. The AN/TSQ-71 was further modified in the 1980s to the AN/TSQ-71B, which again modified the radar and upgraded the radios. It is now being modified again and is called the AN/TSQ-71B() Modified. This modification replaces the air conditioners and modifies the internal wiring of the shelter. The radar trailer is also being replaced as the equipment passes through Tobyhanna Army Depot, Tobyhanna, PA, during the closed loop support program.

Despite these changes, the system has many deficiencies. The deficiencies include a manpower intensive radar; outdated communications systems; vulnerability to electronic countermeasures; excessive setup and teardown times; availability of parts; and the lack of a moving target indicator for detecting low-altitude, slow-moving targets. The system has long since passed its useful life.

The ATNAVICS will have many new features to make life easier (and longer) in a combat situation. Two persons will be able to setup and teardown the system in no more than 30 minutes. The system will be self-contained and transportable by road, rail, or aircraft (C-130 Hercules or larger), and can be slingloaded by a UH-60 Black Hawk or larger. It will have a mean-time-between-failure of 400 hours, mean-time-to-repair of 1 hour, and an availability rate of at least 97.5 percent. If radar is used, it must have frequency agility and electronic counter-countermeasures capability. It also must survive on the nuclear, biological, chemical battlefield. Communications will have secure voice and frequency-hopping capabilities. It also will be able to interface with existing and emerging voice, data, imaging, positioning, and command and control networks. A training device to allow for development and maintaining of operator proficiency will be embedded.

When will this fantastic new system be fielded? Well, don't start packing up your AN/TSQ-71B just yet. Moving ATNAVICS through the Army's acquisition process will take a while. The operational requirements document was staffed at the U. S. Army Aviation Center, Fort Rucker, AL, in January 1992. Fielding is scheduled for 1997. Once it is in place, the ATC picture will look a lot better, well into the next century.

SGM Wilson is assigned to the U.S. Army Air Traffic Control Activity, Fort Rucker, AL.

U.S. Army Air Traffic Control Activity

Readers are encouraged to address matters concerning air traffic control to: Commander, USAAVNC, ATZQ-ATC-MO, Fort Rucker, ALO 36362-5265

PEARL'S

Survival Tip: Dry Feet

During the winter months, you may notice children wearing plastic bags over their socks and inside their boots. Their parents apparently know the importance of keeping their children's feet dry when it is cold. This technique will definitely keep outside moisture from getting to the socks or feet. It also sounds like a good way to keep your feet dry while working on the flight line, or flying during winter, or while involved in other outdoor activity.

Although this arrangement may be safe for a few hours, serious problems can develop. The plastic bags will prevent foot perspiration from evaporating. The moisture will instead be absorbed by the sock, making the feet damp. This, in turn, speeds the cooling of the feet and can lead to frostbite.

We do not recommend this as a long-term technique for keeping your feet dry. However, if plastic bags are the only thing available to keep the outside moisture from your feet, it is extremely important to change your socks often. Do not wait for your feet to feel cold. You should check your feet and socks after the first hour and every half hour after that. At the first sign of cold feet, put on dry, clean socks.

It is much easier to prevent frostbite, or even cold feet, than to bear the pain and discomfort these conditions can bring. Take care of your feet!

Western Region Survival School

The Western Region Survival School, Lake Oswego, OR, has scheduled the following classes for the remainder of fiscal year 1992:

- Basic Land Survival: 8 to 12 March 1992 and 15 to 20 March 1992.
- Hot Climate - Desert: 5 to 10 April 1992; 12 to 17 April 1992; 17 to 22 May 1992; 24 to 29 May 1992; 7 to 12 June 1992; 14 to 19 June 1992; 2 to 7 August 1992; and 9 to 14 August 1992.
- Overwater Survival: 5 to 8 July 1992 and 12 to 15 July 1992.
- Survival Instructor Course: 13 to 25 September 1992.

Mobile training team courses can be scheduled to meet training needs and requirements on-site. Normal scheduling should be done 90 days in advance. An URGENT class can be scheduled upon notification. All courses offer civilian college credits. For further information, you may call Mr. Frank Heyl, director of training, 503-636-6254 or write to Universal Training Systems, 15200 S.W. Twin Fir Road, Lake Oswego, OR 97035.

Personal Equipment and Rescue/survival Lowdown

If you have questions about ALSE or rescue/survival gear, write to AMC Product Management Office, ATTN: AMCPM-ALSE, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798, or call DSN 693-3573 or commercial 314-263-3573

Flight Line Maintenance—The Critical Element

by Master Warrant Officer 4 (MW4) Jesse H. Dize

The prudent and efficient use of limited resources is crucial for maintaining aircraft combat readiness in today's Army. Equipment, parts, supplies, technical schools, and incentive pay are limited by budget constraints. Test equipment and the number and experience level of mechanics and technicians are limited by austere tables of organization and equipment (TOE). Even time available for aircraft maintenance is limited by other training requirements and duty commitments—a question of priorities.

The aircraft must continue to fly. Pilots must meet and maintain aircraft currency requirements and continuously train for their combat mission. Aircraft systems require exercise under all modes of operation to ensure serviceability. Ground units require reliable aircraft support.

Many diverse requirements require attention while maintaining aircraft combat readiness in accordance with the standards outlined in Army Regulation 700-138. No flying program will survive for long without an effective aircraft maintenance program.

By doctrine, Army Aviation has three levels of maintenance—aviation unit maintenance (AVUM), aviation intermediate maintenance (AVIM), and depot maintenance. Within AVUM are two closely intertwined but distinctively different types of organizational maintenance that I call activity maintenance (AM) and flight line maintenance (FLM). AM provides production control, quality control, technical supply (class IX aviation), shop support, and support maintenance coordination for at least three FLM elements. Although AM supports FLM, the success of an aviation unit greatly depends on FLM.

This article emphasizes the critical nature of daily aircraft maintenance procedures that occur in the operational environment. Most of this maintenance is done on aircraft parked in an area in such a manner that will allow for immediate aircraft operation. This area is called the flight line; hence, the term FLM.

An aircraft maintenance program begins with, and depends on, the dedication, expertise, and effort expended by crewchiefs and pilots on the flight line. It is the only level of maintenance that has daily contact with the aircraft. It is the level at which preventive maintenance begins and fault detection first occurs. FLM is the foundation for the entire aircraft maintenance program. Before the new TOEs, FLM was under the operational control of AM. Aircraft maintenance personnel easily could be moved between FLM and AM based on requirements and abilities. However, with the arrival of the J- and L-series TOEs, FLM became the responsibility of a company/troop totally separated from the AM element.

FLM is aircraft maintenance a crewchief does using a small torque wrench and the tools out of an aircraft general mechanic's tool box. The use of additional special tools is considered case-by-case. Because of the limitations imposed by the TOE on aviation company/troop maintenance, FLM maintenance generally is limited to—

- Replacement of easily accessible parts and assemblies that do not require special equipment or test, measurement, and diagnostic equipment (TMDE).

- Lubrication, cleaning, and minor adjustments.
- Inspections, by sight or touch, of easily accessible components.
- Performance of preventive maintenance inspections.
- Proper documentation of all maintenance using appropriate forms.
- Proper preservation and tagging of uninstalled aircraft parts.

If these requirements are exceeded, the maintenance should be referred to AM by a work order.

FLM is responsible for the accuracy of materiel condition status readiness reporting. Preventive maintenance inspections, according to the appropriate checklist, are the most important functions done by the crewchief. The most important FLM function done by the pilot is a thorough postflight inspection after completion of a mission.

AM does all unit level maintenance that is beyond the capability of the flight line. Phase maintenance inspections and unscheduled inspections are the responsibility of AM. (For the this report, all major recurring periodic inspections/services will be called phase.) Work orders for intermediate or higher level maintenance are managed by AM. AM is responsible for the following:

- Request stock and issue parts. This responsibility includes the prescribed load list (PLL), mandatory parts list (MPL), and bench stock. Bench stock includes common hardware, supplies, and consumables.
- Stock and issue of special tools and equipment.
- Maintenance and rotation of petroleum, oil, and lubricants (POL).

Note that FLM activities normally do not have the resources or authority to stock PLL/MPL, bench stock, and POL.

The challenge for FLM is formidable. Meeting aircrew training, aircrew currency, combat mission training, and support requirements while maintaining aircraft in combat mission readiness is not an easy task. However, it can be done, and done without lowering standards, taking short cuts, or working unusually long hours. A unit that excels in FLM typically—

- exceeds materiel readiness standards,
- scores high on no-notice maintenance evaluations,
- experiences rapid-phase, turnaround times, and
- experiences low incidence of mission aborts.

These same units generally display high morale and esprit de corps.

To accomplish the mission, FLM must abide by certain principles and guidelines and follow certain standards. Over the years these "general rules of thumb" have served me well. These rules were developed from various documents and publications; instruction received from mentors; experiences relayed by peers; observations as a major Army command aircraft maintenance evaluator; and as a maintenance technician/officer in an armored cavalry regiment, armored division, and infantry division.

A good FLM program is guided by the following general rules:

- *Triangular Rule.* FLM constantly coordinates with operations for training and mission requirements and with AVUM for maintenance and parts to support present and future requirements. FLM ensures that AM and operations are communicating effectively.
- *As Soon As Possible Rule.* When a fault condition exists or is anticipated—
  - Work it off ASAP.
  - Work-order it ASAP.
  - Order parts ASAP.
  - When parts are received, install them ASAP.
  - When aircraft status changes, notify AM and aircraft operations ASAP.
- *Numbers Rule.* When there is a fault entry and it is not being worked off immediately, a document number (parts request) or work order number must be included with the fault entry.
- *One Page Rule.* One page of Department of the Army Form 2408-13 entries equals 4 man-days of direct, produc-

tive maintenance effort. This timeframe does not include awaiting parts, personnel nonavailability, or other inspection requirements.

- *Can't Fix It If We Don't Know It's Broke Rule.* When a fault condition is noted or anticipated, it must be recorded. If the crewchief cannot correct it, a work order must be passed to the AM.
- *Pay The Piper Rule.* An aircraft requires X number of maintenance man-hours per flying hour. The hours can be spread out or paid all at once (i.e., during phase). Price does not include nonproductive, nonmission capable (NMC) time caused by lack of parts, personnel or planning.
- *Procrastination Rule.* Fault conditions carried forward without any corrective action initiated have a nasty habit of turning into grounding conditions at the most inconvenient times.
- *25-Hour Rule.* Prephase inspections and test flights should be conducted approximately 25 flight hours before the phase inspection due time. Work orders, requests for parts, consumables, and supplies required for phase completion and fault correction are initiated at this time.
- *If It Ain't Broke, Don't Fix It Rule.* Make certain that a problem really exists before fixing it. Do enough troubleshooting and analysis to ensure that a problem is correctly identified before beginning corrective action. Don't fix the wrong problem.
- *25 to 100 Rule.* Controlled exchange has a 100-percent chance of increasing the workload by at least 75 percent and a 33-percent chance of damaging the exchanged part. This damage will increase parts, requisitions, and dollar cost by 100 percent.
- *Environmental Rule.* Crewchief productivity is directly proportional to the suitability of the work area. Factors such as comfort; lighting; and proximity of aircraft to maintenance, parts, and inspectors have a tremendous effect on both quantity and quality of FLM.
- *Times Three Rule.* Unscheduled maintenance consumes three times more resources than does scheduled maintenance. Unscheduled maintenance is extremely disruptive to normal maintenance and mission flow.
- *Monday Morning Rule.* Whenever possible, schedule all activities such as motor stables, common task training, and appointments for Monday morning. This will allow for uninterrupted and more efficient work flow throughout the remainder of the week.
- *Whose Job Rule.* Responsibilities are delineated in local policy. Crewchiefs know what they can and cannot do, and when, where, and how to go for assistance, work orders, etc. The FLM supervisor teaches crewchiefs all of the above and acts as a liaison between the crewchief and the AM.
- *Why Wasn't It Rule.* When an aircraft experiences unscheduled maintenance, ask "Why wasn't it found on the prior inspection, (i.e., preflight, preventive maintenance, postflight, etc.)?" Take corrective action to prevent a similar occurrence.
- *Flow Rule.* The AM can only assemble so many phase teams at any one time. To prevent needless accumulation of NMC time, all FLM elements supported by the AM should consolidate their aircraft flow chart at the AM level.
- *No-Fly Work Rule.* When the aircraft is not flying, someone is working on it. There is always work to be done.
- *"P" Rule.* Proper prior planning prevents poor performance. This includes ordering parts, preparing deferred work orders, scheduling aircraft to be down for fault correction and preventive maintenance between phases, and coordinating

with AM for maintenance support.

- *Exchange Rule.* When a part is received for use on one aircraft but is used on another, treat this action as a controlled exchange. This will ensure that another part gets ordered and provides an audit trail.
- *Phase Rule.* The duration of a phase is directly proportional to the condition of the aircraft and inversely proportional to the amount and quality of prior planning. A phase is only an inspection. Any fault corrections required because of conditions found during the inspection are, in effect, unscheduled maintenance.

Training of personnel (crewchiefs, pilots, and supervisors) to develop a high degree of maintenance discipline is an essential ingredient necessary to improve FLM standards. Commanders must emphasize the importance of preventive services and maintenance and establish an effective crewchief training program. Do not overlook AM AVIM and U.S. Army Aviation Systems Command's local area civilian technical representatives as sources for training support.

The training program must include the proper conduct of preventive maintenance checks/inspections, servicing, and maintenance of the aircraft. It should include instruction on work requests, part requests, reconciliation of requests, and the limitations and capabilities of both the FLM and AM sections. This training should be included on the unit's training schedule to ensure that technical training is part of the unit training mission.

Pilots should receive specialized training in preflight and postflight inspections and maintenance operational check (MOC) procedures.

All personnel should receive local training for aircraft materiel readiness standards, readiness reporting procedures, and the proper usage of forms and records.

The crewchief-pilot combination is the most critical element of FLM. The duties of this team completely cover the aircraft on a normal mission day. The crewchief covers the aircraft from landing at the end of a mission day to takeoff at the beginning of the next mission day. The pilot covers the aircraft from preflight through postflight. The crewchief and pilot have an overlap of duties during preflight and postflight. Duty overlap also occurs when aircraft runups are required for the completion of MOCs.

These two key players, working together, should detect most fault conditions at an early enough stage to prevent major mission and scheduling disruptions. Fault conditions include conditions that adversely affect the mission, materiel readiness reporting, or aircraft maintenance. Training of the players should emphasize this point.

The FLM program must undergo constant evaluation to ensure training is effective, goals are met, and problems are identified early. The program requires a guide that is easy to understand and use. It should list all references, to include local standing operating system and policy letters. This guide should be readily available to all members of the FLM element. A sample FLM evaluation guide is available upon request.

MW4 Dize is assigned to the Department of Aviation Systems Training, U.S. Army Aviation Logistics School, Fort Eustis, VA

U.S. Army Aviation Logistics School

Readers may address matters concerning aviation logistics to: Assistant Commandant, U.S. Army Aviation Logistics School, ATTN: ATSQ-LAC, Fort Eustis, VA 23604-5415

Human Factors in Aircraft Maintenance and Inspection

by Mr. Robert A. Feeler

The *U.S. Army Aviation Digest* thanks the Flight Safety Foundation and the author for use of this article. It was published first in the July/August 1991 issue of the *Aviation Mechanics Bulletin*.

Much has been written about "fitness," usually dealing with the fitness of our equipment, our training, and our physical abilities or stamina, and the like. And this is very appropriate! Seldom, though, have I seen much written on the human factors involved with those indispensable people performing day-to-day maintenance and inspection tasks so important to the health and well-being of our complex aircraft. This article is a re-print of an earlier article, which deals with this issue in some depth.

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Human factors and their influence on flight safety are usually associated only with pilots and flight operations. In the maintenance area, a mistake or omission by a technician is frequently viewed as a not unexpected "technician error." The fault, in fact, may have been a human factors-based error, in an area that has received less attention by researchers in human factors. Yet, the errors could impair the safety of flight as much as those in flight operations that, heretofore, have received the most attention and research.

The importance of human factors in technician performance is currently receiving more recognition as a result of several serious and potentially catastrophic incidents within the past few years. The inflight failure and loss of a major portion of the upper fuselage skin of an Aloha Airlines Boeing 737 in 1988 was the catalyst for the initiation of a major study into the human factors aspects of aircraft maintenance and inspection under the direction of the U.S. Federal Aviation Administration (FAA).

Other instances of undetected defects have occurred in the past. A McDonnell Douglas DC-9 aircraft suffered an inflight failure of the aft pressure bulkhead due to faulty interpretation of previous radiographic (X-ray) inspection results. A Fairchild F-27 suffered an inflight failure of a wing panel several years ago. The subsequent investigation disclosed that the previous X-ray inspection showed the defects, but they were overlooked by the technician reviewing the X-ray images. Many general aviation aircraft have had accidents or incidents attributed to defects which had been overlooked during normal inspections and maintenance.

The spectacular nature of the Boeing 737 fuselage skin failure, however, was the one instance which served to wake the industry and the regulatory agencies responsible for assuring the safety of the traveling public. In investigating this

fuselage structure failure, it was found that the defects which resulted in the loss of the top of the fuselage covering several seat rows had been present for some time and should have been detected by the inspections called out by the manufacturer and included in the operator's inspection program. The defects initially consisted of small fatigue cracks in the skin originating at rivet holes, a problem not uncommon in many aircraft. What was uncommon in this case was that the "system"—the maintenance program—failed to detect these defects while they were minor and they were allowed to progress until the cracks joined. Consequently, the top of the fuselage ripped open as if there were a zipper in the skin while the aircraft was pressurized.

The technicians who performed the previous inspections certainly did not intend to overlook the defects, so how did the system allow this to happen? Among the actions coming out of this investigation is the major study of the human factors in aircraft maintenance and inspection that is ongoing under the direction of the FAA. However, participation is worldwide and the results will certainly change the methods in which the technician is trained, supervised and assigned, as well as change the tools and equipment the technicians uses to accomplish various inspection and maintenance activities.

Human factors being studied include the following categories:

- Information transfer and communications
- Work environment
- Selection and training of inspectors
- Equipment and job performance aids
- Inspection methods
- Human limits and capabilities
- Problems of vigilance/boredom/complacency
- Nondestructive Inspection (NDI) techniques and equipment

Although individual managers and supervisors may not be in a position to make major human factors-related changes or improvements in their own shops and hangars, it is important that individual technicians be aware of these potential problems and take personal steps to reduce technician error.

Communications Is Never-ending

Information transfer and communications are never-ending. The scope and volume of technical manuals and inspection/maintenance instructions have become more complex. Whereas a single loose-leaf binder or two were previously adequate to outline the workings of an entire airplane, it is not uncommon now to have an entire bookcase filled with manuals for the information on just one aircraft type.

New technologies are being explored by those who are researching methods of presenting necessary information to the technician. The use of on-line computer technical data which can be accessed by the technician is one of the devices being explored. This would enable the user to access a central data file, which is up-to-date, and would not require anything on-site except a terminal and printer.

A more recently implemented means of storing aircraft maintenance data for ready recall is that of compact disc/read only memory (CD/ROM) storage devices that can accommodate text and graphics of an entire aircraft library on a single disc. Such sophisticated equipment is available now; however, we cannot realistically expect these advances to be practical for any but the largest air carriers in the near future.

Another aspect of the information exchange problem is that of knowing what is happening to other aircraft similar to those in your operation. Each individual has a vital role in this aspect of communications. Manufacturers and many of the regulatory agencies have database programs to collect in-service reports of maintenance irregularities and defects. These programs, however, can only be effective if you, the technician, submit reports of occurrences in your operation.

Data Exchange Is Important

In the United States, the FAA system for collecting and disseminating maintenance irregularity data is called the service difficulty report (SDR) program. The SDR program has grown so large that it has become limited in its responsiveness to the individual technician. The FAA has recognized the limitations of the SDR program and is working to develop a more responsive system which is capable of issuing alerts when a trend or series of like events occurs.

Manufacturers are usually responsive to reports of defects or irregularities in their equipment; however, individual manufacturers may not readily exchange data with each other. Airlines and other commercial operators do exchange some technical data, but the stress of competition and simply taking care of one's own business have reduced the effectiveness of this informal exchange.

On a local level, the use of more specialists and specific job assignments have reduced the ability of the technician to "know what is going on" outside of his direct area of responsibility. All of these points merely serve to illustrate the importance of technicians telling each other, the manufacturers and the regulatory agencies when something out of the ordinary takes place. Individuals and supervisors must take the initiative to seek data pertinent to the aircraft in their operation and to share that information.

Work Environment Affects Performance

The work environment provided for the technician has proven to be an important factor in assuring consistent quality in the performance of maintenance and inspection tasks. It is unrealistic, for example, to expect an inspector to perform a detailed inspection of an extensive structural area outside, in the dark, using only a flashlight. Similarly, an inspector should not be assigned to perform a critical inspection of a structural component that is covered with dirt and grease.

Perhaps more than any other human factor affecting the technician's performance, the work environment is directly within the control of the local operator and the supervisor.

Selection and Training Of Inspectors Needs Re-evaluation

In the past, it was common practice that the most senior mechanic became the next inspector, in the ever-present seniority system. Although this usually assured that the inspector had a reasonable amount of experience, it did not necessarily ensure that the new inspector was qualified to perform the assigned tasks. As for educational opportunities, other than the largest air carriers and manufacturers, very few operators had formal training programs for inspectors.

In the 1950s and 1960s, this reliance on experience to qualify as an inspector may have been valid. In the 1990s, experience as a technician alone does not qualify one to be an inspector. More complex aircraft and more highly stressed components in fail-safe and damage-tolerant structures demand more knowledge. Training and expertise in the use of NDI techniques is now a common prerequisite for an inspector in any but the most basic aircraft.

Managers and supervisors should restudy their inspector selection and training programs to assure that the persons selected for those positions are qualified to perform reliably the required tasks.

Equipment and Job Performance Aids Relate to Quality Work

Years ago, every technician was required to have a basic toolbox; there were one or two copies of the maintenance manual somewhere in the hangar; and the company had a few "special tools" in the stockroom. This way of performing aircraft maintenance will not get the job done in the 1990s. Analyses of maintenance costs have shown that the cost of acquiring ade-

quate tools, equipment and manuals is minuscule compared to the high cost of ineffective maintenance resulting from a lack of these job performance aids.

It is the task of the manager or supervisor to assure that the manuals are usable on the job. Job performance aids, coupled with training, can reduce errors and cut required maintenance time.

Errors Can Be Costly

Technician errors fall into four categories:

- False removal (generally high when there is time pressure)
- Failure to isolate or detect
- Damage during the work performance
- Time error, which usually involves self-detected error and simply extends the overall time to complete the task

All these errors can be reduced substantially or eliminated with adequate and effective job performance aids. Unfortunately, simply having the manuals available does not guarantee that they will be used. Some technicians tend to go to the manual either because they recognize its value or because they have no other place to go for help, while others will tend to rely on memory or will ask peers or supervisors for information.

The use and usability of manuals are two separate but closely related issues. If the usability is high, it will foster but not guarantee usage. Factors affecting the usability are:

- Accessibility—is it convenient and available; does it break the work down into convenient packages?
- Portability—can it be taken to the job site?
- Completeness—does it cover the entire task?
- Accuracy—is it accurate and applicable to the equipment?
- Flexibility—can it be used for various tasks?
- Presentation—is it clear and easy to read; are there sufficient pictorials and charts?

The wording and language used in job performance aids should be simple, concise and consistent. The use of the same terms for various steps should be enforced. If the work "raise" is used, then do not use "elevate" or "lift"; it must always be "raise."

The importance of job performance aids is emphasized, for example in the United States, by the fact that nearly 40,000 of the current 65,000 aircraft technicians currently on the job will qualify for retirement in the next 10 years. Their replacements will be learning on-the-job and the effective use of job instructions, manuals and equipment will be a critical factor in ensuring safety and reliability.

Choice of Inspection Methods Is Critical

The selection of the inspection method to be used in searching for a particular aircraft defect is critical to the reliability of the inspection findings. Up to now, little research has been conducted to determine the efficiency of various inspection techniques. It has more or less been assumed that if a defect was present, it would always be found by a conscientious inspector. Unfortunately, the Aloha Airlines accident and other incidents have proven the fallacy of this assumption.

On the other hand, engineers have researched the efficiency and reliability of inspection methods in other applications, and some of this knowledge can be applied to aircraft inspection.

In the manufacturing environment, inspections can be repeated by a second individual or reject parts can be subjected to a more detailed inspection to verify the defects or return the part to service. Studies have shown that the number of missed defects can be affected by the work place environment, training, worker attitudes, and fatigue or boredom.

In fault-finding inspections of aircraft structures, however, there should be little concern for a false indication of a fault because this can be identified in the course of repair. On the other hand, there should be little tolerance for a missed defect in

aircraft structural inspections. Inspection intervals are established based upon the anticipated in-service growth rate of a defect. If the defect is missed at one inspection, it may grow to an unsafe condition prior to the next scheduled interval.

To reduce the exposure to a missed defect, should aircraft structure inspections be doubled by having the same items inspected by a second individual? It is required practice in air carrier and common practice in many corporate maintenance operations to have a second set of eyes reinspect work performed for jobs that could affect airworthiness; it is logical to consider this same level of assurance for other aircraft structural components.

Other aspects of the inspection method also can have a profound effect on the success of the inspection. Often, the inspector has never seen an actual example of the defect which he or she has been assigned to detect. The vast majority of inspected parts are defect-free, and the inspector therefore has a tendency to see what he expects to see: nothing. It is very valuable to have a sample of the defect for an inspector to examine prior to performing the on-site inspection.

The need for a sample defect is particularly important for the various NDI techniques. The inspector needs to see how the defect will appear on the film or display of the inspection device. If the inspector has never seen a defect in conducting the NDI, it is likely that a small defect could be overlooked.

The second inspection, or supervisor review, of NDI results also has proven to be advisable for critical inspections. Under the pressure of time, an evaluator can overlook a defect indication on an X-ray film. Eddy current, ultrasonic inspection and dye penetrant inspections do not provide a permanent record, and the supervisor review must be performed by looking over the inspector's shoulder or by performing a repetitive inspection.

There Are Limits to Human Capabilities

What can we reasonably expect of a human inspector? Is it reasonable to expect an inspector to find virtually every crack in a skin section which may total 60 square yards (50 square meters) or more? Industrial studies have explored such limitations in nonrelated fields, but these aspects of inspector job performance are just now coming under serious review.

How small a defect can an inspector be expected to see with the naked eye? If a magnifying glass is called for, is the size and optical quality of the lens specified? There can be a vast difference in the clarity and detail of the view provided by a cheap, 10-power magnifier compared to an industrial-quality lens of high quality.

Other aspects of human limits should also be considered when assigning an inspector to look for structural defects. It is not reasonable to perform detailed structural inspections for an entire shift without adequate breaks to rest and to relieve the stress of constant close inspection through a magnifying glass.

Consideration should be given to rotating assignments among the available inspection crew members and to provide variation in the work to optimize the efficiency of the inspection. For critical areas, managers should consider assigning a supervisor or different inspector to spot check or completely reinspect the area to assure that defects are not overlooked.

The attitude of the individual is critical to the consistent performance of quality work. An individual who has personal problems is likely to not pay attention to details.

Supervisors must be alert and cognizant of individual attitudes of inspection personnel. If someone is functioning poorly, assign that individual to a less critical task.

Problems of Vigilance And Boredom Addressed

Boredom and complacency are a constant threat to the proper performance of aircraft technicians. One of the more

serious incidents that resulted from the repetitive nature of a simple task was the inflight loss of oil from all three engines on a Lockheed 1011 that resulted from the O-ring seals being omitted from the sump plugs on all three engines after servicing. This near catastrophe is an example of what can occur when technicians lose interest in the job and management fails to establish adequate safeguards. Supervisors must be alert to the onset of boredom or developing complacency. If the factors causing the condition cannot be altered, additional checks or balances must be established to counteract it and assure that safety is not compromised.

Reliability of NDI Activities Examined

One promising area of improvement that resulted from industry aging aircraft conferences (FSF-sponsored Second Annual International Conference on Aging Aircraft; proceedings available for $30 to FSF members and $35 to nonmembers) has been that of improved NDI techniques. The U.S. National Aeronautics and Space Administration (NASA), FAA, airlines and manufacturers of NDI equipment have redoubled their efforts to improve existing NDI methods and to accelerate development of new technologies.

Based upon information compiled to date, existing X-ray, eddy current, ultrasonic and dye penetrant inspection techniques appear capable of detecting defects with acceptable reliability. Where errors have occurred, human faults in application or interpretation have usually been found responsible. For those NDI methods that produce a permanent record, a second opinion of the radiographic films or video record of the inspection results has proven to be an excellent method of assuring that defects are detected.

Future NDI methods may be automated and less prone to human error, such an infrared thermography using differences in heat energy to pinpoint defects or leaks, and various acoustic devices using the reflection and refraction of sound energy to locate defects.

In the meantime, operator technique and proper evaluation of the test results remain central to assuring that NDI produces reliable and accurate results. Experience has proven that proper training is critical not only in the use of the equipment, but in the application and evaluation of the results for each specific area or component being inspected. The availability and use of defect samples and measurement standards such as test blocks is of paramount importance to assure that the equipment is functioning properly and will produce the desired result.

No single agency, operator or individual has all the answers to eliminate the human factor errors from aviation technician performance. Communication is one of the most effective means of eliminating hidden hazards and preventing incidents and accidents. Your admitted "almost mistake" may prevent someone else's accident.

Mr. Feeler is the editorial coordinator for the *Aviation Mechanics Bulletin*.

U.S. Army Aviation Systems Command

Readers may address maintenance questions to: Directorate for Maintenance, ATTN: AMSAV-MPED, 4300 Goodfellow Blvd, St. Louis, MO 63120-1798; or call DSN 693-2532 or Commercial 314-263-2532

Command Sergeant Major Fredy Finch Jr

Safety

Safety is more than a program, philosophy, or action word. As leaders, soldiers and members of the civilian workforce, we must always think "safety."

Army Aviation has done a terrific job at establishing safety initiatives. The risk assessment requirement has contributed much to the emphasis we must put on every daily task.

Everyone must be fully aware of their surroundings and risks to safe operations. Leaders must use precise judgement when determining an acceptable level of risk with any activity.

We must be vocal about issues that present danger or exceed reasonable risk. If everyone assumed the responsibility for safety, we would find fewer drivers without seat belts, fewer injuries in the work area, and fewer sports and physical training injuries.

Responsible, safe behavior reduces the man-hours lost because of injury or property damage. You must take a moment to think about the potential adverse consequences of each of your actions.

We must do a mental risk assessment of each activity. If we do this mental exercise, it can remind us to—

- buckle up;
- place our children in proper restraints;
- lift heavy objects correctly or with assistance;
- take off stereo headsets/radios when walking, jogging, or cycling on roadways; and
- take safety precautions with all physical training and sports activities.

You may have noticed by now that I have not used the word "accident." Frankly, I do not believe the word is applicable in a discussion about safety. Injury or damage to government property resulting from a violation of policy or procedure is not an accident.

When a soldier hurts himself or causes thousands of dollars worth of damage to an aircraft or vehicle by violating procedures, we have often called it an accident. When the same soldier misses a formation—costing nothing and injuring no one—we consider his action a violation of the Uniform Code of Military Justice and discipline the soldier accordingly.

I do not understand this rationale. Maybe it is the reason we do not have many soldiers missing formations, but we sure have many so-called "accidents." Safety and procedural violations are serious and should be handled accordingly.

The noncommissioned officer (NCO) channel plays a critical role in this process. The key to a solid safety program is total awareness, education, and proactive behavior. As the senior safety NCO on this post and the top of the NCO channel, my goal for safety is "zero defects."

We have a tough job here. We owe it to the future of the Army and Army Aviation to conserve dollars and protect our most important asset—the soldier. We can protect our soldiers by making safety a state of mind. We must assess the risk of every project. We must take responsibility and handle violations of safety policies and procedures accordingly.

Aviation Digest AUTHOR GUIDE

Manuscripts

Aviation-related articles are restricted in length, should be original, unpublished manuscripts. A lead article should be no more than 4 to 6 ***Aviation Digest*** pages (2 columns); a feature article should be no more than 2 to 4 Aviation Digest pages (3 columns); and Departments should be no more than 1 ***Aviation Digest*** page (700 words, 3 columns). Manuscripts may be handwritten, typed double-spaced or keyboarded, preferably in WordPerfect 4.2 or 5.0 on a 5 1/4-inch diskette. However, other word processing programs (MultiMate or WordStar) are acceptable. Please send two dark hard copies. Manuscripts should contain no classified material and should be cleared through the author's local chain of command and Public Affairs Office before submission.

If unable to provide a diskette, send the original printed output copy only of all keyboard characters on a separate page (letters, numbers, punctuations, and symbols), both upper and lower cases. These characters will be used for scanning purposes.

The ***Aviation Digest*** staff also will clear most articles through appropriate channels. We reserve the right to edit your article to ensure it conforms to our style and does not exceed a 12.9 reading grade level. If acronyms are used, please identify each as well as titles of regulations or books.

Graphics

Appropriate graphics enhance the reader's understanding and are important in clarifying most manuscripts. Clear, sharp photographs are important. If available, photographs (5 x 7 glossy black and white prints are preferred, negatives are acceptable, and 35mm slides only as a last resort). Figures should be included as well as accompanying captions typed on a separate sheet of paper explaining each photo, figure, or illustration.

If unavailable, any ideas for artwork should be included in the form of sketches or rough drawings. Specific questions on artwork or photos should be directed to Fred Martin, DSN 558-3619 or commercial 205-255-3619.

Subjects

Potential subjects for the near future are force structure; i.e., appropriate mix of heavy, light, and special aviation operational forces in the Active and Reserve Components; development of quality soldiers; aviation-related history; safety; aircraft accident prevention; equipment and rescue/survival gear; air traffic control; doctrine and training; maintenance; research and development; communications; aviation medicine; operations; military aviation personnel information; human factors engineering; and any other issues pertinent to the Aviation Branch.

Although we play up a central idea in each issue, we are not theme-restricted. We publish timely, thought-provoking, factual information on Army Aviation plans and policies, regardless of their relevance to the central idea (theme).

Authors

If you have any ideas for an article, or editorial questions call DSN 558-3178/3619 or commercial 205-255-3178/3619. Authors should include their name, address, present, or past duty position (whichever is appropriate for basis of writing the article), DSN and or commercial phone number(s) for contact if further information is necessary, and a brief biographical sketch. Mail to the following address:

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